University of Groningen

Intrinsically Motivating Social Influence

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DOI:
[10.33612/diss.132151368](https://doi.org/10.33612/diss.132151368)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2020

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):
Milovanovic, M. (2020). *Intrinsically Motivating Social Influence: When social influence strengthens intrinsic motivation and sustainable energy behaviour*. [Thesis fully internal (DIV), University of Groningen].
<https://doi.org/10.33612/diss.132151368>

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Intrinsically Motivating Social Influence

When social influence strengthens intrinsic motivation and sustainable energy behaviour

The research presented within this dissertation was funded by the
Pieken in de Delta programme of Agentschap NL, for the
“Smart grid: rendement voor iedereen!” project.

Financial support for printing of this dissertation was received from
the University of Groningen and the Kurt Lewin Institute

Cover art	Spomenka Miličević
Cover & Lay-out	Marko Milovanović
Print	Ridderprint www.ridderprint.nl

ISBN: 978-94-034-2755-3 (Paperback)

ISBN: 978-94-034-2756-0 (Electronic)

rijksuniversiteit
 groningen

Intrinsically Motivating Social Influence

When social influence strengthens intrinsic
motivation and sustainable energy behaviour

Proefschrift

ter verkrijging van de graad van doctor aan de
Rijksuniversiteit Groningen
op gezag van de
rector magnificus prof. dr. C. Wijmenga
en volgens besluit van het College voor Promoties.

De openbare verdediging zal plaatsvinden op

maandag 21 september 2020 om 12.45 uur

door

Marko Milovanović

geboren op 20 december 1985
te Split, Kroatië

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Chapter 1

General Introduction

To achieve the energy transition from fossil fuels to renewable energy sources, large-scale behavioural changes are required. Attempts to promote such behaviour changes will be more effective when they target key antecedents of energy behaviour. Studying psychological factors underlying energy behaviour and behaviour change has been a key area of research in the field of environmental psychology. Making the energy transition happen means that people need to change their daily energy-use behaviour in a sustainable way. A novel approach to promote sustainable energy behaviour are local energy initiatives, in which people combine efforts to invest in local renewable energy production, adopt and use sustainable energy technologies, and to reduce fossil energy use (Seyfang & Haxeltine, 2012). Such initiatives can be a key source of social influence that motivate sustainable energy behaviour and are therefore a key theme of our research.

Social influence is typically understood as being extrinsically motivated (Cialdini & Trost, 1998; Deutsch & Gerard, 1955; Ryan & Deci, 2000a), which can be detrimental to intrinsic motivation. This may be problematic, as behaviour change that is intrinsically motivated is more likely to sustain itself across time and contexts. We will study the relationship between social influence and intrinsic motivation. More specifically, this dissertation will study whether social influence can secure and foster intrinsic motivation and thereby influence behaviour and lasting behavioural change.

The traditional understanding of social influence is that people act out what the group wants in order to gain social acceptance or to avoid social sanctions (Cialdini & Trost, 1998; Deutsch & Gerard, 1955). This extrinsic view of social influence, a process referred to as normative influence, is rooted in the dual-process theory of the group (Deutsch & Gerard, 1955), which regards groups as external to the self. The group-extrinsic-to-self approach implies that participating in a local energy initiative would strengthen extrinsically motivated engagement in sustainable energy behaviour, driven by the desire to avoid social sanctions or reap social benefits, rather than reflecting intrinsic motivation to engage in sustainable energy behaviour out of a personal sense of importance to do so. This view of the group therefore implies that behavioural change that results from joining a local energy initiative is merely extrinsically motivated, and people are not expected to engage in sustainable energy behaviour out of their intrinsic volition.

We argue that group-based social influence does not always merely reflect the extrinsic motivation to engage in sustainable energy behaviour in the context of a local energy initiative. Our assumption is based on another theoretical perspective on social influence in the social psychology literature. Notably, according to Turner's self-categorization theory (Turner, 1982; 1987; 1991), the group can be experienced as an extension of the self (or indeed, one form of it), particularly when people identify strongly with the group. This reasoning implies that social influence, particularly among those who strongly identify with the group, can intrinsically motivate people to act in line with the group goals.

Self-categorization theory suggests that there is no clear *psychological* distinction between the group one identifies with and the self, as the concept of the group can become internalized as a part of the self. Self-categorization theory therefore states that when people strongly identify with a group, the group goals can be experienced as one's own goals. This emphasizes the "group within the individual" rather than the "individual within the group" as assumed in traditional group dynamics (Turner, 1982). It is plausible to assume that when a local energy initiative is formed around a sense of importance to engage in sustainable energy behaviour, this group importance of sustainable energy use

can be internalized into a personal sense of importance of sustainable energy use, which implies that individuals can become intrinsically motivated to engage in sustainable energy behaviour.

Self-categorization theory expands and transcends the dual-process approach (Deutsch & Gerard, 1955) by explaining how the group can be experienced both as external to the self and internal to the self, depending on the extent to which the individual identifies with the group. The group, also for high identifiers, retains an external (objective) dimension as it is a social reality that contains other people. However, for high identifiers, the group can also be internalized and becomes part of one's identity. Specifically, particularly when people strongly identify with the group, group goals are likely to become one's own goals. In contrast, when people do not strongly identify with the group, group goals are likely to remain more extrinsic to the self (i.e. as assumed in the dual process theory of Deutsch & Gerard, 1955).

In sum, regarding the question of whether intrinsic motivation can arise from social influence, based on the self-categorization theory, we say: "yes, it can", particularly when the individual strongly identifies with the group. What follows from this approach is that people who strongly identify with the group, such as a local energy initiative, can internalize the sense of importance of the group to use energy more sustainably in the self—which can result in a personal goal for sustainable energy use. This means that group identification moderates whether the importance of sustainable energy behaviour conveyed by the group affects the extent to which people are intrinsically versus extrinsically motivated to engage in sustainable energy behaviour, which in turn affects actual participation in sustainable energy behaviour.

Now that we have established a theoretical basis for how, and under what conditions, social influence can foster intrinsic motivation, let us examine how the construct of intrinsic motivation has been understood in the literature. Intrinsic motivation has been described as an "evolved propensity to perform an activity because it is inherently interesting or enjoyable, fulfilling the individual's needs of autonomy and competence" (Ryan & Deci, 2000a,b). In contrast, extrinsic motivation is described as an activity that is done to attain some

outcome (such as to gain social approval or avoid social sanctions: Ryan & Deci, 2000b).

Another understanding of intrinsic motivation advanced by Lindenberg (2001a) proposes a distinction between enjoyment based (hedonic) intrinsic motivation (in line with the definition by Deci & Ryan, 2000a,b), and obligation based intrinsic motivation, which applies when one acts on the feeling that one must follow one's rule, norm, or principle (Frey, 1997). Viewing intrinsic motivation through the lens of Lindenberg's goal framing theory (Lindenberg 2001b, 2006, 2008; Lindenberg & Steg, 2007) allows intrinsic motivation to occur in situations where behaviour would fulfil hedonic goals, such as play; as well as normative goals, such as pro-environmental behaviour, where intrinsically motivated people are likely to act based on a principle, goal or value, rather than an external reward. Acting upon normative goals—even when they require an investment of personal resources such as money or effort to achieve for example a pro-environmental goal—can provide people with meaning and eudemonic feelings (Venhoeven, Bolderdijk, & Steg, 2016). We take this broader definition of intrinsic motivation by also considering obligation-based sources such as personal values and goals, as well as personal goals that are derived from group goals (for those who strongly identify with the group).

An important source of intrinsic motivation that has been identified in the environmental domain are biospheric values. Specifically, people may engage in sustainable energy behaviour because they derive meaning from acting upon values that are important to them, particularly biospheric values (De Groot & Steg, 2010), and acting on one's values feels good (Taufik, Bolderdijk, & Steg, 2015; Venhoeven et al., 2016). Schwartz (1992) defines values as “desirable trans-situational goals varying in importance, which serve as a guiding principle in the life of a person or other social entity” (p. 21). Biospheric values reflect a key concern with the quality of nature and the environment for its own sake (Steg, Perlaviciute, van der Werff, & Lurvink, 2014). When a certain type of values is important to a person, he or she may feel morally obliged to act upon it, and doing so is internally rewarding (Lindenberg, 2001a). Indeed, research suggests that acting to benefit the environment feels good, as people derive pleasure and

satisfaction from doing the right thing (Bolderdijk, Steg, Geller, Lehman, & Postmes, 2013; Taufik et al., 2015; Venhoeven, Bolderdijk, & Steg, 2013; Venhoeven et al., 2016). People experience these intrinsic rewards more strongly when they strongly endorse biospheric values (Venhoeven, 2016). Hence, we expect that the sense of importance of using energy sustainably can be derived both from individual factors (notably biospheric values), as well as from group factors (when the group has the goal to use energy more sustainably), particularly among those who strongly identify with the group.

Our understanding of intrinsic motivation is that it is experienced when one acts upon valued principles in one's life, such as biospheric values, or group goals for those that strongly identify with the group. As indicated above, research has shown that acting on what is important to the self is self-rewarding, and therefore intrinsically motivating (Bolderdijk et al., 2013; Taufik, Bolderdijk, & Steg, 2015; Venhoeven, Bolderdijk, & Steg, 2013, 2016). In the view proposed by Ryan and Deci (2000b), behaviour that is intrinsically motivating is likely to be performed for its own sake, and not as a means toward an end—such as a fulfilling a personal value. We argue that this is a too narrow conceptualization of 'intrinsic motivation', as it defines the motivation as intrinsic to the *object* of fascination (such as in play), rather than intrinsic to the *subject* interacting with the object (i.e. the self). We therefore propose that intrinsic motivation can also be experienced when a person acts in a way to fulfil a principle or a value, in line with Lindenberg's (2001a) notion of obligation-based intrinsic motivation. We further expect that a strong obligation-based intrinsic motivation would render one less susceptible to environmental cues that would change one's goal to do the right thing and to act sustainably, as the motivation that drives sustainable energy behaviour would come from inside. That is, people with a strong intrinsic motivation to engage in sustainable energy behaviour are more likely to act sustainably, even in the presence of cues in the environment that may prompt them to opt for the most pleasurable or profitable option (cf. Lindenberg & Steg, 2007; Steg, 2016).

Our reasoning provides a novel theoretical contribution to the understanding of intrinsic motivation and how it may emerge from the group.

Now that we have reasoned how intrinsic motivation can arise from the group, we ask: how would different indicators of social influence affect intrinsic motivation, and are there specific criteria that increase the likelihood that social influence will foster intrinsic motivation?

What criteria does social influence need to fulfil to foster intrinsic motivation?

We expect that the likelihood that social influence may enhance, or secure intrinsic motivation depends on the *type* of social influence exerted by the group. Specifically, we propose that intrinsic motivation to perform pro-environmental behaviour in a group context will be strongest when an individual has strong biospheric values, and when the form of social influences scores positively on the following three dimensions: 1) the importance the group assigns to sustainable energy behaviour is clearly conveyed, 2) minimal group pressure is involved, and 3) issue importance is formulated at the same level of specificity of the behaviour.

The first criterion for social influence to foster intrinsic motivation is that social influence needs to explicate group goals, such as the importance of using energy sustainably. We refer to this criterion as ‘issue importance’. The second criterion for fostering intrinsic motivation is that the individual group members feel they are choosing to endorse the issue importance of their own volition—rather than feeling pressured to do it by the group, which would be an extrinsic motivation. That is why we refer to this criterion as ‘minimal group pressure’. The third criterion is that the group goals that are being conveyed by social influence will be more likely to foster intrinsic motivation if they are formulated at the same level of specificity as the desired outcome behaviour. That is why we refer to this criterion as ‘behavioural specificity’. Our assumption that the level of specificity on which the outcome behaviour is formulated matters, is based on the attitude-theory that proposes that the relationships between attitude and behaviour are strongest when both are measured at the same level of specificity: the closer the correspondence between the formulation of attitude and the behaviour, the more predictive the attitude is likely to be of behaviour (Stephen & Kraus, 1995; Weigel et al, 1974). We expect that the same is true for similarity

in level of formulation of the social influence variables and the desired outcome behaviour.

Based on this reasoning, we propose that social influence variables that fulfil these criteria the most will be the ones that are most likely to foster intrinsic motivation. We will now introduce three types of social influence variables we are going to study in Chapters 2 and 3, namely descriptive norms, injunctive norms, and group importance, and explain how they score on the three criteria introduced above. Table 1.1 summarises how the three types of social influence variables score the three criteria.

The first type of social influence we introduce in Chapter 2 result from descriptive norms. Descriptive norms are simply perceptions of those behaviours typically performed by other members of a given (in)group (Cialdini & Trost, 1998). In the case of local energy initiatives, this concerns, among others, the perception of how many residents are inclined to join the local energy initiative and use smart energy technologies. We expect that descriptive norms are less likely to strengthen intrinsic motivation to join the initiative and use smart energy technologies than the other types of social influence because they do not score positively on all three criteria we introduced above. First, descriptive norms do not clearly convey the importance of sustainable energy behaviour as they simply denote which behaviour most group members perform—they do not convey *why* they do so. Regarding minimal group pressure, descriptive norms may exercise a form of group pressure as the individual might feel unease when behaving differently from most others of the group. Regarding behavioural specificity, since descriptive norms reflect observed behaviour, they are by default formulated at the same level of specificity as behaviour. In sum, although descriptive norms are formulated at the level of specific behaviour, they do not clearly convey issue importance and are likely to be experienced as exerting group pressure. For these reasons, they are unlikely to be a strong source of intrinsically motivated behavioural change.

The second type of social influence introduced in Chapter 2 results from perceived group importance. We define perceived group importance as people's perception that the group they belong to thinks it is important to engage in

sustainable energy behaviour, such as joining the local energy initiative and using smart energy technologies. We expect that group importance will be particularly likely to strengthen the intrinsic motivation to join the initiative and use smart energy technology because it scores positively on all three dimensions we listed above. First, group importance clearly conveys that a person believes that the group thinks it is important to join local energy initiatives and use smart energy technologies. Second, group importance is unlikely to be experienced as group pressure to engage in sustainable energy behaviour because it conveys a value, rather than an observed behaviour or a social expectation. Third, group importance can be defined at the level of the target behaviour, making it easier for social influence to translate into intrinsic motivation and behaviour because of the compatibility principle (cf. Ajzen, 1988; Ajzen & Fishbein, 1977).

The third form of social influence introduced in Chapter 3 results from injunctive norms. Injunctive norms reflect perceptions of whether a behaviour is approved or disapproved of by group members. They convey to an individual what is acceptable and unacceptable social behaviour (Cialdini & Trost, 1998). We expect that injunctive norms are less likely to foster intrinsic motivation compared to group importance, because injunctive norms do not score positively on all three dimensions (i.e. they imply group pressure; see below), but they are more likely to foster intrinsic motivation compared to descriptive norms, because they convey issue importance where the descriptive norm does not. Specifically, injunctive norms do convey the importance of sustainable energy use by making clear which behaviour is approved (if it's approved, it must be important to the group). Yet, injunctive norms imply social approval and thus disapproval, which indicates that some group pressure is present, which makes it more likely that injunctive norms foster extrinsic motivation. Regarding behavioural specificity, injunctive norms can be specified at the same level as the behaviour. In sum, although injunctive norms convey issue importance and can be formulated at the level of the behaviour at stake, they evoke a degree of extrinsic motivation as well, and are for this reason less likely to be a strong source of intrinsically motivated behaviour. Table 1.1 summarizes how the three types of social influence score on criteria that are important for intrinsic motivation.

Table 1.1

Three criteria that increase the likelihood of social influence fostering intrinsic motivation for individuals that identify with the group

	<i>Issue importance</i>	<i>Minimal group pressure</i>	<i>Behavioural specificity</i>
Group importance	X	X	X
Injunctive norm	X		X
Descriptive norm			X

Note: Biospheric values are excluded from this table as they are not a group-based variable

As indicated earlier, we expect group identification to play a moderating role in the way social influence affects intrinsic motivation (in line with the self-categorization approach by Turner), or extrinsic motivation (in line with the dual-process approach by Deutsch & Gerard). Any form of social influence may be stronger when people more strongly identify with the group, but we expect this moderation effect to be more likely to occur for those types of social influence with more intrinsic properties as summarized in Table 1.1. In our case, we particularly expect the moderation effect of group identification for group importance. Overall, we expect that the more strongly the social influence meets our three criteria, the more likely it will foster an intrinsic motivation to use smart energy technologies, particularly among those who strongly identify with the group—and thereby indirectly influence the decision to perform pro-environmental behaviour.

Subsequently, we expect that the effects of social influence on intrinsic motivation can in turn increase the likelihood that people engage in pro-environmental behaviour, and that this will more likely be the case for those types of social influence that more fully meet the three criteria (i.e. group importance), and the stronger the individual identifies with the group. When such mediation occurs, we speak of an intrinsically motivated decision to perform pro-environmental behaviour. The interplay of social influence variables and group

identification, with intrinsic motivation mediating their effect on behaviour is conceptualized in Figure 1.1 below.

Figure 1.1. Conceptual diagram of the predicted moderated mediation.

The effects of social influence and biospheric values on intrinsic motivation

As the relationship between biospheric values and intrinsic motivation is already well-established in the literature (Bolderdijk et al., 2013; Taufik, Bolderdijk, & Steg, 2015; Venhoeven, Bolderdijk, & Steg, 2013, 2016), Chapters 2 and 3 will study whether social influence—in addition to the effect of biospheric values—can explain unique variance in intrinsic motivation to engage in sustainable energy behaviour. Unique variance explained by social influence in a model with biospheric values would mean that social influence can be an additional source of intrinsic motivation (in addition to biospheric values). However, if social influence were to explain the *same* variance in intrinsic motivation as biospheric values, it would mean that there is no difference in the motivational quality derived from biospheric values (coming from the self), or social influence (coming from the group).

The research reported in Chapters 2 and 3 is based on a longitudinal field study conducted among residents of a neighbourhood in the Dutch city of Amersfoort. Chapter 2 describes a field study that took place in the neighbourhood preceding the formation of the local energy initiative and aims to understand whether social influence can foster an intrinsic motivation to use

smart energy technologies and encourage people to join a local energy initiative that is about to be established in their neighbourhood that aims to promote the use of these technologies. Specifically, Chapter 2 aims to test whether both descriptive norms and group importance can explain additional variance in intrinsic motivation besides biospheric values. Moreover, we study whether descriptive norms and group importance will particularly foster the intrinsic motivation for those that strongly identify with the neighbourhood. We expect identification with the neighbourhood will particularly moderate the effect of group importance (the social influence indicator that scores high on issue importance, minimal group pressure, and behavioural specificity, as explained above). Finally, Chapter 2 tests whether the effect of the social influence variables and biospheric values on the decision to join the local energy initiative is mediated by intrinsic motivation to use smart energy technologies.

Chapter 3 describes a field study in the same neighbourhood among a sample of residents that have joined the local energy initiative and aims to understand whether social influence can foster one's intrinsic motivation and intention to reduce fossil energy use among members of the initiative. Specifically, Chapter 3 aims to replicate and extend the study reported in Chapter 2 in four different ways. Firstly, where the dependent variable in Chapter 2 was actual participation in the local energy initiative, the dependent variable in Chapter 3 is the intention to use energy more sustainably. Secondly, where the independent variables in Chapter 2 (descriptive norms and group importance) were operationalized at the level of using smart energy technologies, the independent variables in Chapter 3 are operationalized at the level of reducing (fossil) energy use. Thirdly, where the operationalization of the group in Chapter 2 was the participant's residential neighbourhood (prior to the start of the local energy initiative), the group in Chapter 3 is the actual local energy initiative that all participants joined. Finally, where Chapter 2 only included two types of social influence variables, descriptive norms and group importance, Chapter 3 adds a third type: injunctive norms. In doing so, Chapter 3 studies whether social influence derived from a local energy initiative can positively affect an intrinsic motivation to reduce fossil energy use. We study whether

descriptive norms, injunctive norms, and group importance will particularly foster the intrinsic motivation to reduce fossil energy use for those that strongly identify with the initiative and expect this effect will emerge most strongly if the criteria of issue importance, minimal group pressure, and behavioural specificity are met (i.e., for group importance). Similar to Chapter 2, Chapter 3 also aims to test whether the three social influence variables explain additional variance in intrinsic motivation compared to biospheric values, to examine whether social influence can be an additional source of intrinsic motivation alongside biospheric values. Finally, Chapter 3 tests whether the effect of the social influence variables and biospheric values on the intention to use energy more sustainably is mediated by intrinsic motivation.

In sum, both Chapters 2 and 3 aim to test whether intrinsic motivation to engage in sustainable energy behaviour will be relatively stronger when the individual has strong biospheric values, and when people experience a type of social influences that scores positively on the following three dimensions: 1) the importance the group assigns to sustainable energy behaviour is clearly conveyed, 2) when minimal group pressure is involved, and 3) when issue importance is formulated at the same level of specificity as the behaviour. We theorize that group importance most strongly meets these criteria best, followed by injunctive norms, and finally descriptive norms. Moreover, we expect group identification to play a moderating role in the extent to which the different types of social influence foster intrinsic motivation.

Is intrinsically motivated behaviour based on social influence sustained over time?

We reasoned above that when social influence affects behaviour by strengthening intrinsic motivation, the behaviour performed will be sustained over time. Chapter 4 will explore whether, and under what conditions, this may be the case in an experimental setting. The experiment is an important methodological addition to the field studies of Chapters 2 and 3, as it gives us more experimental control ruling out alternative explanations for effects, making it possible to infer causation from independent variables such as group identity and social influence on intrinsic motivation and sustainable energy behaviour.

The first assumption we will revisit is that of the dual-process theory (Deutsch & Gerard, 1955), which views the group as external to the self. This assumption implies that all forms of social influence are extrinsically motivating. This may be problematic as extrinsically motivating social influence is likely to only have temporary effects on behaviour, and only when the individual is at risk of social punishment or stands to gain a social reward. In such cases, continuous behavioural reinforcement would be required to keep sustainable behaviour going over time.

One such typical form of extrinsically motivating social influence could be surveillance. Having an observer watch over your performance typically puts social pressure on you to do well at a task. From the point of view of the dual-process paradigm, performing a task that is desired by the group (e.g. sustainable energy production) in the presence of an observer can trigger a desire to gain social appraisal or avoid social sanctions. Therefore, an increase in performance is likely to become contingent on the presence of the observer and likely to dissipate once the observer is no longer present. Such a pattern of a temporary increase in performance in the presence of an observer (or other form of reinforcement), followed by a decrease in performance back to baseline levels once the reinforcement is removed, is typical of behaviour motivated by extrinsic motivation. From the perspective of the dual-process paradigm, a person would not be intrinsically motivated to perform a task that contributes to a group goal (unless they are personally motivated to perform the behaviour), and adding an observer to watch over the performance would be experienced as group pressure.

As indicated above, this is not the only perspective to interpret the effects of social influence on motivation and behaviour. Based on the reasoning we derive from the self-categorization theory (Turner, 1982; 1987; 1991), which views the group as internal to the self, we argue that particularly for those that identify with the group, social influence can foster intrinsic motivation, and that sustainable behaviour based on intrinsic motivation can be self-sustained over time. In the context of the abovementioned example of performing an energy production task in favour of a group goal, and having an observer present, we argue that the extent to which the participant identifies with the group (which we conceptualise

as social influence coming from an ingroup vs. outgroup) will determine whether the group goal will be experienced as one's own goal, and whether the presence of an observer will be interpreted as group pressure or group support; group support would mean that the presence of an observer might even foster the intrinsic motivation to perform well at the group goal.

We base this expectation on our reasoning that people who strongly identify with the group experience group goals as their own. Furthermore, we reason that social influence signals (such as surveillance) from the group one identifies with can possibly be interpreted differently (i.e., as a form of support rather than social control) when the social influence comes from an ingroup compared to an outgroup. We therefore expect that ingroup goals will produce lasting effects on behaviour—i.e. a lasting increase in performance on an energy production task, possibly even when ingroup goals are presented in combination with ingroup surveillance.

In Chapter 4, we will operationalize intrinsic motivation as the voluntary behavioural effort exerted on an energy production task performed on a rowing machine. We opt for an effortful task towards a group goal because the aim is to operationalize obligation-based intrinsic motivation introduced earlier (Lindenberg, 2001a). The energy production task will take place over three repeated measurements which will allow us to have a baseline measure of effort exertion, followed by a measure under the manipulation effects of ingroup vs. outgroup goal, and surveillance vs. no surveillance, followed by a final post-manipulation measure in which surveillance and mentions of group goal are removed. If the energy production behaviour is increased on the second measurement and retained voluntarily on the third measurement (when surveillance is removed so not group pressure is present), we will speak of intrinsic motivation and lasting behavioural change. This would support our reasoning that intrinsically motivating behaviour is self-sustaining over time. If the energy production behaviour is increased on the second measurement, but drops to baseline level on the third measurement, we can speak of extrinsic motivation and temporary behaviour change. This is in line with our expectation that extrinsically motivating behaviour is contingent on reinforcement to persist

over time. Therefore, once the reinforcement is removed, any performance gains are lost.

In sum, based on this reasoning and the theory outlined above, we expect that when people are asked to perform an effortful energy production task: (1) an ingroup goal will increase and sustain effort investment over time, suggesting intrinsically motivated lasting behavioural change; (2) surveillance will increase effort investment when present and decrease effort investment when removed, suggesting temporary behavioural change; (3) the interaction of ingroup goal and ingroup surveillance will result in more effort investment retained after the removal of surveillance, compared to the outgroup goal and outgroup surveillance condition. The third hypothesis suggests that ingroup surveillance will be experienced differently from outgroup surveillance and will be less detrimental to sustained performance on the long term.

In Chapter 5 we will discuss the main findings of this dissertation, recap the lessons learned, and explore avenues for future research.

N.B. The empirical chapters are written in such a way that they can be read independently from the rest of the dissertation. This means that there may be some overlap between chapters.

Chapter 2

How social influence may affect intrinsic motivation to join a local energy initiative—a field study

Local energy initiatives are becoming a popular means to accelerate the sustainable energy transition and promote the use of smart energy technology among their members. Hence, it is important to understand how people are motivated to join initiatives that promote the use of these technologies. Social influence is likely to play an important role in this respect as people may join an initiative and start to use smart energy technologies promoted by these initiatives because they are persuaded by others in their neighbourhood to do so. Yet, it is often assumed that social influence is extrinsically motivating, which may inhibit an intrinsic motivation to join such initiatives and use smart energy technology that is an important source of sustainable energy behaviour. We reasoned and found that social influence may foster one's intrinsic motivation to use smart energy technology and increase the likelihood that people will join a local energy initiative, particularly when the type of social influence conveys issue importance, is delivered with minimal group pressure, and is formulated at the level of (specific) behaviour. Yet in contrast to our expectation, the effect of social influence on intrinsic motivation and initiative membership did not depend on the level of identification with the group.

To achieve the energy transition from fossil fuels to renewable energy sources and reduce energy demand, behavioural changes on a large-scale are

required. If consumers would change their behaviour and act in a more sustainable way, the energy transition would more likely succeed. A novel approach to promote the use sustainable energy behaviour are local energy initiatives, in which people join efforts to, for example, invest in local, renewable energy production and promote the use of smart energy technologies that reduce fossil energy use (Seyfang & Haxeltine, 2012). The aim of such initiatives is to encourage residential use of smart energy technology and sustainable energy behaviour from the bottom up. As participating in local energy initiatives can stimulate sustainable behaviour (Sloot, Jans, & Steg, 2018), it is important to understand what motivates people to become a member of a local energy initiative (Sloot, Jans, & Steg, 2019).

Because local energy initiatives often arise from clearly defined communities, such as neighbourhoods, social influence can play a role in people's decision to join an initiative. Social influence is often thought of as extrinsically motivating, and may therefore inhibit self-sustained behavioural change, as people's decision to join an initiative and act sustainably is based on social reinforcement rather than a personal conviction. Behavioural change based on extrinsic motivation is not guaranteed to last once the extrinsic reinforcement is removed, whereas behavioural change based on intrinsic motivation is more likely to self-perpetuate over time.

We however reason that social influence can be intrinsically motivating under the right conditions and elaborate on our reasoning below. As a case in point, we will study whether and under what conditions different types of social influence affect the intrinsic motivation to use smart energy technology and to become a member of a local energy initiative that aims to promote the use of smart energy technology. We refer to this as motivation to use smart energy technology. Specifically, this study will take place in a neighbourhood in which people can receive smart energy technologies—free of charge—if they choose to join a local energy initiative.

The traditional understanding of social influence is that people act in line with what the group wants in order to gain social approval (Cialdini & Trost, 1998). This extrinsic view of social influence is rooted in the dual-process theory

of the group (Deutsch & Gerard, 1955), which regards groups as external to the self. The approach implies that encouraging people to use smart energy technologies through social influence would result in an extrinsically motivated intention to participate in the initiative—which is driven by the desire to reap social benefits, rather than an intrinsic motivation to accelerate the energy transition. The extrinsic view of social influence therefore implies that any behaviour change that results from social influence is extrinsically motivated, and people are not expected to use smart energy technology out of an intrinsic motivation.

Contrary to this view, we argue that social influence can foster an intrinsic motivation to use smart energy technology. Our assumption is based on another theoretical perspective on social influence in the social psychology literature. Notably, according to the self-categorization theory (Turner, 1982; 1987; 1991), the group can be experienced as an extension of the self, particularly when people identify strongly with the group. This reasoning implies that social influence, particularly among those who strongly identify with the group, can intrinsically motivate people to act in line with the group.

Self-categorization theory suggests that there is no clear distinction between the group and the individual as different forms of the self, at least when people strongly identify with a group. In that case, group goals can be experienced as one's own goals. This emphasizes the “group within the individual” rather than the “individual within the group” as assumed in traditional group dynamics (Turner, 1982). Based on this reasoning, we hypothesise that when a local energy initiative emerges in a neighbourhood whose residents think it is important to use smart energy technology, this group importance can be internalized into a personal sense of importance to use smart energy technology, which can in turn motivate them to become a member of an initiative promoting the use of smart energy technology. Hence, we operationalize intrinsic motivation as a personal sense of importance to use smart energy technologies.

Self-categorization theory expands and transcends the dual-process paradigm (Deutsch & Gerard, 1955) by proposing that group can be experienced both as external to the self and internal to the self, depending on the extent to

which the individual identifies with the group. Specifically, when people strongly identify with a group, the group goals are particularly likely to become one's own goals. In contrast, when they do not strongly identify with the group, the group goals are likely to remain extrinsic to the self (i.e. as assumed in the dual process theory). Hence, concerning the question of whether intrinsic motivation can arise from social influence, we say: yes it can, particularly when the individual strongly identifies with the group. What follows from this approach is that people who strongly identify with the group, such as their neighbourhood, and internalize the sense of importance to use smart energy technology in the self, will have developed a stronger intrinsic motivation to join the local energy initiative.

Another important source of intrinsic motivation that has been identified in the environmental domain are biospheric values. People are likely to engage in sustainable energy behaviour because they derive meaning from acting upon values that are important to them, particularly biospheric values (De Groot & Steg, 2010). Schwartz (1992) defined values as “desirable trans-situational goals varying in importance, which serve as a guiding principle in the life of a person or other social entity” (p. 21). Biospheric values reflect a concern with the quality of nature and the environment for its own sake (Steg, Perlaviciute, et al., 2014). When a certain value is important to a person, he or she feels morally obliged to act upon it (Stern et al, 1999; Steg et al., 2014), and finds it intrinsically rewarding to do so, which is what Lindenberg (2001a) describes as obligation-based intrinsic motivation.

Indeed, research suggests that acting to benefit the environment feels good, that people derive pleasure and satisfaction from doing the right thing (Bolderdijk et al., 2013; Taufik et al., 2015; Venhoeven et al., 2013, 2016). People experience these intrinsic rewards particularly when they strongly endorse biospheric values (Venhoeven, 2016). Hence, we expect that a sense of importance of using smart energy technology can be derived both from individual factors (biospheric values), as well as from group factors (such as a group goal to use smart energy technology), particularly among those who strongly identify with the group.

However, we do not expect all group factors to be equally likely to foster intrinsic motivation, even if the condition of a strong group identity is met. We expect that the likelihood that social influence may enhance or secure intrinsic motivation depends on the intrinsic properties that the type of social influence possesses. Specifically, we propose that intrinsic motivation to perform pro-environmental behaviour in a group will be highest when the individual has strong biospheric values, and when the form of social influences scores positively on the following three dimensions: 1) the importance the group assigns to sustainable energy behaviour is clearly conveyed, 2) group pressure is minimized, and 3) issue importance is formulated at the same level of specificity of the behaviour.

The first criterion for social influence to foster intrinsic motivation is that social influence needs to explicate that the group values a goal, such as the importance of using energy sustainably. That is why we refer to this criterion as ‘issue importance’. The second criterion for fostering intrinsic motivation is that individual group members feel they are choosing to adopt the issue importance of their own volition—rather than feeling pressured to do so by the group, which would reflect an extrinsic motivation. That is why we refer to this criterion as ‘minimal group pressure’. The third criterion for fostering intrinsic motivation is that the group goals that are being conveyed by social influence will most easily translate into behaviour if they are formulated at the same level of specificity as the desired outcome behaviour. That is why we refer to this criterion as ‘behavioural specificity’. Our assumption that the level of specificity on which the outcome behaviour is formulated matters, is based on the attitude-theory that proposes that the level of specificity in attitude-behaviour relations means the closer the correspondence between the attitude formulation and the behaviour, the more predictive the attitude is likely to be (Weigel et al, 1974; Stephen & Kraus, 1995). We expect that the same is true for similarity in formulation of social influence variables.

The first form of social influence we discuss in this chapter results from descriptive norms. Descriptive norms are perceptions of which behaviours are typically performed by other group members in a given context, in this case the

perception of how many residents in the neighbourhood are inclined to use smart energy technology. We expect that descriptive norms are less likely to foster the intrinsic motivation use smart energy technology because they do not score positively on all three dimensions we introduced above and summarized in Table 1.1 below. First, descriptive norms do not clearly convey the importance of using smart energy technology as they simply denote the belief about which behaviour most group members are performing—they do not convey *why* a certain behaviour is commonly performed, and thus the motivation for doing so is unclear. Regarding minimal group pressure, descriptive norms may exercise some group pressure as the individual might feel unease for behaving differently than the group. Regarding behavioural specificity, since descriptive norms describe expected behaviour of other group members, they are by default formulated at the same level of specificity as behaviour. In sum, although descriptive norms are formulated at the level of behaviour, they do not clearly convey issue importance and are likely to induce some group pressure. For these reasons, descriptive norms are less likely to be a source of intrinsic motivation.

The second form of social influence we will study is group importance. We define group importance as people's perception that the group they belong to thinks it is important to use smart energy technology. We expect that group importance will be more likely to strengthen the intrinsic motivation to use smart energy technology because it scores positively on all three dimensions we listed above, provided that the individual identifies with the group (see also Table 2.1 below). First, group importance clearly conveys that a person believes that the group finds it important to use smart energy technology. Second, group importance can be conveyed such that people do not feel pressured by the group to engage in sustainable energy behaviour. Third, group importance is defined at the level of desired behaviour, making it clear for people to do what they think is important. Table 2.1 summarizes how the two types of social influence score on criteria that are important for intrinsic motivation.

Table 2.1

Three criteria that increase the likelihood of social influence fostering intrinsic motivation for individuals that identify with the group

	<i>Issue importance</i>	<i>Minimal group pressure</i>	<i>Behavioural specificity</i>
Group importance	X	X	X
Descriptive norm			X

Note: Biospheric values are excluded from this table as they are not a group-based variable

In addition to the three criteria discussed in the previous paragraphs and summarized in Table 2.1 above, we expect group identification to play a moderating role in the way social influence affects intrinsic motivation (in line with the self-categorization approach by Turner) or extrinsic motivation (in line with the dual-process approach by Deutsch & Gerard). Any form of social influence may be stronger when people identify with the relevant social group, but we expect this moderation more likely to occur for those types of social influence with more intrinsic properties summarized in Table 2.1. In our case, we expect the moderation effect of group identification on intrinsic motivation to be stronger for group importance. Overall, we expect that more strongly the social influence meets our three criteria, the more likely it is that social influence will foster an intrinsic motivation to use smart energy technologies—and thereby indirectly influence the decision to join a local energy initiative that promotes the use of smart energy technology via an intrinsic motivation.

Subsequently, we expect that the effects of social influence on participation in the local energy initiative that promotes the use of smart energy technology will be mediated by intrinsic motivation to use smart energy technology, and that this will more likely be the case for those types of social influence that more fully meet the three criteria (i.e. group importance), particularly when individuals strongly identify with the group. When such mediation occurs, we speak of an intrinsically motivated decision to join the local initiative.

We started this chapter by saying that social influence can have an effect (i.e. explain unique variance) on intrinsic motivation, and that this effect will be stronger the more one identifies with a group from which the social influence emerges. Subsequently, we proposed that the effect of social influence on intrinsic motivation will be stronger for those types of social influence that have more intrinsic properties (i.e. meet more of three criteria we proposed). Then, we proposed to test whether this relationship between social influence and intrinsic motivation still holds when controlling for a more established source of intrinsic motivation—biospheric values. Finally, we proposed that the effect of social influence on actual behaviour—the decision to join a local energy initiative that promotes the use of smart energy technology—will be mediated by intrinsic motivation to use smart energy technology, and that this will more likely be the case when one identifies with the group, and when the type of social influence has more intrinsically motivating properties (i.e. the three criteria).

The present study

We will test our theorizing that when a person strongly identifies with a group, the social influence to use smart energy technology and thereby join a local energy initiative that promotes the use of such technology is more likely to be internalized and thus foster an intrinsic motivation, particularly when the social influence is conveyed in the form of group importance. The first set of hypotheses focus on the possible effects of different types of social influence on intrinsic motivation, whether those effects are moderated by group identification, and whether the social influence variables explain additional variance in intrinsic motivation in addition to biospheric values. These hypotheses are represented by the conceptual model in Figure 2.1. below. H1: Descriptive norms are least likely to explain unique variance in intrinsic motivation in addition to the variance explained by biospheric values, even though the effect may be moderated by group identification with the neighbourhood. H2: Group importance is most likely to explain unique variance in intrinsic motivation in addition to the variance explained by biospheric values, particularly for residents that strongly identify with the neighbourhood.

Figure 2.1. Conceptual diagram of the predicted effects of the two social influence variables on intrinsic motivation to use smart energy technology, which can be moderated by group identification with the neighbourhood. The (moderated) effects of the social influence variables are tested in a same model with the direct effect of biospheric values on intrinsic motivation.

To explore how social influence can affect actual behaviour via strengthening intrinsic motivation, we will also test whether intrinsic motivation to use smart energy technology mediates the effect of social influence variables on actual participation in a local energy initiative that promotes the use of smart energy technology. We however do not control for the influence of biospheric values on intrinsic motivation in the moderated mediation models as our statistical tools (Hayes, 2017) do not allow for that. Hence, the second set of hypotheses focus on possible moderated mediational pathways between our social influence variables, intrinsic motivation, and actual membership of the local energy initiative, in which group identification is again the proposed moderator for the effect of social influence on intrinsic motivation. These hypotheses are represented by the conceptual model in Figure 2.2. below. H3: The effect of descriptive norms on the decision to join the local energy initiative is least likely to be mediated by intrinsic motivation, even though the effect may be moderated by group identification with the neighbourhood. H4: The effect of group importance on the decision to join the local energy initiative is most likely to be mediated by intrinsic motivation, particularly for residents who strongly identify with the neighbourhood.

Figure 2.2. Conceptual diagram of the predicted moderated mediation of how the effect of the two social influence variables on the decision to join a local energy initiative can be mediated by the intrinsic motivation to use smart energy technology (which can in turn be moderated by group identification with the neighbourhood).

Method

Procedure.

This study was aimed at evaluating a local energy project—“Smart grid: rendement voor iedereen! (Smart grid: return for all)” —that aimed to test smart energy systems, an innovation designed to allow people to use energy more sustainably. The project was organized by a consortium of governmental and commercial parties and took place in a residential area, in and around the Nieuwland neighbourhood in Amersfoort, a middle-sized city in the Netherlands. This neighbourhood comprised of single houses equipped with rooftop solar panels; inhabitants were generally families with children. Early 2013, the residents were invited to join the local energy initiative called ‘AmersVolt’, which officially started in September 2013. As an incentive to participate in the initiative, the residents were offered a smart meter, five smart plugs and a home energy management app free of charge, in return for their participation in the project and research. There was only budget to admit 100 households into the project, so that was the maximum number of research participants who we could label as initiative-joiners.

The data used in this study is based on a self-report questionnaire that features two samples of residents from the Nieuwland neighbourhood. The first sample is a random sample taken from the Nieuwland population in the period of September–December 2012. The second sample are all Nieuwland residents that decided to participate in the local energy initiative, who completed the questionnaire in the period of March–June 2013. The first sample was meant to include a large group of Nieuwland residents which would also include a sample of residents that ended up *not* joining the initiative. The demographic profile of the first and second sample reflected those of Nieuwland residents. This design enabled us to test which factors predict the decision to actually join the local energy initiative. In other words, this design allowed us to examine to what extent biospheric values, descriptive norms, group importance and group identification would affect the intrinsic motivation to use smart energy technologies and the likelihood of actually joining the smart grid project that aims to test whether the adoption of smart energy technologies will lead to more sustainable household energy use.

Participants.

This study was conducted among residents of the Nieuwland neighbourhood of the Dutch city of Amersfoort, who all had rooftop solar installations. In total 188 Nieuwland inhabitants completed the questionnaire ($M_{age} = 46$, $SD = 11$, 67.4% male), of which 77 participated in the smart grid project ($M_{age} = 49$, $SD = 10$, 85% male) while 111 did not participate in the project ($M_{age} = 44$, $SD = 11$, 55.5% male).

Measures.

Values were assessed by means of a short version of Schwartz's value scale that has extensively been tested and validated in various studies (de Groot & Steg, 2007, 2008; Steg, de Groot, Dreijerink, Abrahamse, & Siero, 2011; Steg et al., 2014). We included the extended scale included 16 values (Steg et al., 2014), including 4 biospheric value items: 'respecting the earth', 'unity with nature', 'protecting the environment', 'preventing pollution'. Following Schwartz (1992), respondents rated the importance of these values "as guiding principles in their lives" on a 9-point scale ranging from -1 = opposed to my principles, 0 = not

important to 7 = extremely important. Respondents were urged to vary the scores and to rate only a few values as extremely important. The mean score on biospheric values was $M = 4.51$ ($SD = 1.28$, $\alpha = .87$).

Identification with the neighbourhood was measured with six items from the In-group Identification scale (Leach et al., 2008): 'The fact that I live in Nieuwland is an important part of who I am', 'Being a resident of Nieuwland is an important part of how I see myself', 'I feel a bond with the residents of Nieuwland', 'I feel solidarity with the residents of Nieuwland', 'I feel committed to the residents of Nieuwland', 'I have a lot in common with the average resident of Nieuwland', 'I am similar to the average resident of Nieuwland' (1 = Completely disagree, 7 = Completely agree, $M = 3.19$, $SD = 1.10$, $\alpha = .89$).

The descriptive norm was measured with a single item: 'According to you, which percentage of Nieuwland residents will use smart energy technology in the future?' (1 = 0%, 7 = 90%, $M = 4.11$, $SD = 1.47$).

Group importance was measured with a single item: 'Residents of Nieuwland think it is important to use smart energy technology in the future' (1 = Completely disagree, 7 = Completely agree, $M = 3.87$, $SD = 1.43$).

Intrinsic motivation was measured with three items (adapted from Steg & de Groot, 2010): 'I would feel morally obliged to use smart energy technology', 'I would feel guilty for not using smart energy technology', and 'I would feel proud for using smart energy technology' (1 = Completely disagree, 7 = Completely agree, $M = 3.72$, $SD = 1.44$, $\alpha = .79$).

The act of joining the local initiative that aimed to promote the use of smart energy technology was operationalized by a binary variable that coded all initiative partakers in the sample as 1 ($n = 74$), and non-partakers as 0 ($n = 110$).

Data analysis.

To test hypotheses 1 and 2, we performed regression analyses including biospheric values, the social influence variables, group identification, and the interaction of social influence and identification as predictors, and intrinsic motivation as dependent variable. To successfully calculate the interaction effect, we centered all variables at their means prior to the analysis. To compare the

effect of each form of social influence on intrinsic motivation, and compare it to the effect of biospheric values, we tested each hypothesis in a separate model. The sample size differs due to missing values¹. To test the hypotheses 3 and 4 we performed moderated mediation analyses (Model 7) using the PROCESS Macro for SPSS by Hayes (2017) for each type of social influence separately.

Results

The relationship between biospheric values, descriptive norm, and group identification with intrinsic motivation.

We found that the model of biospheric values, descriptive norm, group identification, and the interaction of descriptive norm and group identification explained 26% of the variance in intrinsic motivation to use smart energy technologies ($F(4,172) = 14.95, p < .001$). As can be seen in Table 2.2, the main effects of biospheric values and group identification are significant, while the main effect of descriptive norm, and the interaction effect of descriptive norm and group identification are non-significant. These results imply that both stronger biospheric values and stronger identification with the neighbourhood are associated with a stronger intrinsic motivation to use smart energy technology. This means we found no evidence of descriptive norms explaining unique variance in intrinsic motivation in addition to the variance explained by biospheric values, regardless of how strong the resident identifies with the neighbourhood (which is in line with H1). Yet, in contrast to our expectation, group identification did explain unique variance in intrinsic motivation.

¹ This is because non-participants participated in the study through a pen-and-pencil questionnaire performed before the start of the project, while the participants participated in the study through an online questionnaire at a later point in time.

Table 2.2

Regression Analysis for the Model of Biospheric values, Descriptive norm, Group identification, and the Interaction of Descriptive norm and Group Identification Predicting Intrinsic Motivation (N = 176)

Variable	<i>B</i>	<i>SE B</i>	β
Biospheric values	0.31	0.09	.28***
Descriptive norm	0.03	0.07	.03
Group identification	0.45	0.09	.35***
Descriptive norm x Group identification	0.09	0.05	.11

*** $p < .001$.

The relationship between biospheric values, group importance, and group identification with intrinsic motivation.

We found that the model of biospheric values, group importance, group identification, and the interaction of group importance and group identification explained 35% of the variance in intrinsic motivation to use smart energy technology ($F(4,175) = 23.03, p < .001$). Table 2.3 shows that the main effects of biospheric values, group importance, and group identification are significant, while the interaction effect of group importance and group identification is not statistically significant. Stronger biospheric values, a stronger belief that one's neighbours think using smart energy technology is important, and a stronger identification with the neighbourhood are related to a stronger intrinsic motivation to use smart energy technology. Interestingly, the interaction effect of group importance and group identification was not significant while the main effects were, suggesting these factors are independently related to intrinsic motivation. As such, these results partly support H2: group importance is most likely to explain unique variance in intrinsic motivation in addition to the variance explained by biospheric values, but this effect was not dependent on how

strongly residents identify with the neighbourhood. Again, group identification explained unique variance in intrinsic motivation, which we did not hypothesize.

Table 2.3

Regression Analysis for the Model of Biospheric values, Group Importance, Group identification, and the Interaction of Group Importance and Group Identification Predicting Intrinsic Motivation (N = 179)

Variable	<i>B</i>	<i>SE B</i>	β
Biospheric values	0.27	0.07	.25***
Group importance	0.40	0.07	.41***
Group identification	0.19	0.09	.15*
Group importance x Group identification	0.04	0.05	.05

* $p < .05$. *** $p < .001$.

The mediation analysis of descriptive norm, group identification, intrinsic motivation, and actual participation in the local energy initiative.

The model of descriptive norm, group identification, and the interaction of descriptive norm and group identification explained 18% of the variance in intrinsic motivation to use smart energy technology ($F(3,173) = 12.94, p < .001$). The stronger the participants identified with the Nieuwland neighbourhood, the stronger their intrinsic motivation to use smart energy technology ($b = .53, p < .001$). The other main effects and the interaction effect of descriptive norm and group identification on intrinsic motivation were not statistically significant. Furthermore, we found that intrinsic motivation did not mediate the—by group identification moderated—relationship between the descriptive norm and actual participation in the local energy initiative that promotes the use of smart energy technology. The indirect interaction effect of descriptive norm and group identification from the bootstrap analysis was not statistically significant for all

levels of group identification. The direct effect ($c = -.27$) was significant and negative, so this was a direct-only, non-mediation (Zhao, Lynch, & Chen, 2010). This means that we found no evidence that the effect of descriptive norms on the decision to join the local energy initiative was mediated by intrinsic motivation, regardless of how strong the resident identified with the neighbourhood (which is in line with H3). The descriptive norm did have a significant—but negative—direct effect on the decision to join the local energy initiative.

Mediation analysis of group importance, group identification, intrinsic motivation, and actual participation in the local energy initiative.

The model of group importance, group identification, and the interaction of group importance and group identification explained 29% of the variance in intrinsic motivation ($F(3,176) = 23.46, p < .001$). The main effect of group importance was significant: the more participants believe that people in Nieuwland find it important to use smart energy technology in the future, the stronger their intrinsic motivation to use smart energy technology ($b = .42, p < .001$). The main effect of group identification was significant as well: the stronger the participants identified with the Nieuwland neighbourhood, the stronger their intrinsic motivation to use smart energy technology ($b = .24, p < .05$). The predicted interaction of group importance and group identification was not statistically significant.

We further found that the indirect effect of group importance on actual participation in the local energy initiative that promoted the use of smart energy technology was positive and significant across all levels of group identification (-1 SD, mean, and $+1$ SD), suggesting that the extent to which group importance affected the decision to join the local energy initiative was mediated by intrinsic motivation, depended on how strong the resident identified with the neighbourhood. Interestingly, the three indirect effects (-1 SD, mean, and $+1$ SD) had similar, but slightly increasing values as the level of identification increased of $a \times b = .15$, $a \times b = .17$, and $a \times b = .19$, respectively, with the 95% confidence intervals ranging from .0486 to .3906, implying that the mediation effect was not moderated by group identification.

In the indirect path, a unit increase in group importance increased intrinsic motivation by $a = .42$. Holding group importance constant, one unit increase in intrinsic motivation increased actual participation by $b = .41$. The direct effect ($c = -.10$) was not significant, so this was an indirect-only (i.e. fully) mediated moderation (Zhao et al., 2010). As the interaction effect of group importance and group identification was not significant, it means that we did not find empirical support for H4: the effect of group importance on the decision to join the local energy initiative is most likely to be mediated by intrinsic motivation, particularly for residents that strongly identify with the neighbourhood. Rather, we found that the effect of group importance on participation was mediated by intrinsic motivation irrespective of the extent the participant identified with their neighbourhood.

Discussion

The sustainable energy transition requires substantial changes in behaviour, reducing the use fossil energy sources as much as possible. Local energy initiatives are established to accelerate the energy transition and promote sustainable energy behaviour, for example by promoting the use of smart energy technology—such as in the neighbourhood initiative we studied in this chapter. As participating in local energy initiatives can indeed stimulate sustainable energy behaviour (Sloot, Jans, & Steg, 2018), it is important to understand what motivates people to join a local energy initiative. Social influence is likely to play an important role in this respect as people in a neighbourhood may persuade more neighbours to use smart energy technology and join a local energy initiative. Yet, it is typically assumed that social influence is extrinsically motivating, which may inhibit an intrinsic motivation to use such technology and join local initiatives that aim to promote the use of such technology volitionally. An extrinsically motivated decision to use smart energy technology is likely not a durable solution for the energy transition, as behavioural reinforcements or rewards that fuel extrinsic motivation need to be maintained for sustainable energy behaviour to persist over time. We found that an intrinsically motivated decision to use smart energy technology by joining a local energy initiative can be derived from social influence, particularly when social

influence conveys issue importance, is delivered with minimal group pressure, and is formulated at the level of (specific) behaviour. Interestingly, in contrast to our expectation, the effect of social influence on intrinsic motivation to use smart energy technology did not depend on the extent to which people identified with their neighbourhood.

We set out to study how different types of social influence would affect people's intrinsic motivation to install smart energy technology and join a local energy initiative. Based on the reasoning that the group is external to the self, it is often assumed that social influence by the group is *de facto* extrinsically motivated. Yet, we theorized that the group can be viewed as an extension of oneself for those who strongly identify with the group, and that therefore social influence can be intrinsically motivating, particularly when, in addition to identifying with the group, the social influence factor conveys issue importance, carries minimal group pressure, and is formulated at the level of behaviour.

We first tested the effects of two social influence variables, descriptive norm and group importance, on the intrinsic motivation to use smart energy technologies. In each model, we compared the effect of the social influence variable, and the interaction between the social influence variable and group identification to the effect of biospheric values on intrinsic motivation. We found that descriptive norm was not significantly related to intrinsic motivation, regardless of the extent the participant identified with the neighbourhood—which was in line with our hypothesis (H1). Also, as expected, we found that group importance had a significant positive effect on intrinsic motivation, even when biospheric values were included in the model. However, the effect of group importance on intrinsic motivation was not moderated by group identification, which means that we did not find full support for our hypothesis that group importance would explain unique variance in intrinsic motivation in addition to the variance explained by biospheric values, particularly for residents that strongly identified with the neighbourhood. Surprisingly, we instead found that group identification had a direct effect on intrinsic motivation, explaining unique variance in both descriptive norm and group importance. We go into possible reasons why this effect could occur below.

We reasoned that the social influence variables would particularly strengthen intrinsic motivation to use smart energy technology among those who strongly identify with their neighbourhood. The reasoning behind this is that group identification represents the extent to which the group is experienced as part of the self, and that for those that identify strongly with the group, issues that are valued by the group are more likely to become issues valued by the self. The finding that group identification had a main effect on intrinsic motivation might suggest that the identification with the neighbourhood is not an ‘empty’ construct but carries information on issue importance that can be internalized. For example, as Nieuwland was a sustainable suburb built with rooftop PV homes from the onset (De Haan, Toering & Rook, 2016), it could be that being a resident of Nieuwland is perceived as an identity associated with valuing sustainable energy behaviour. Therefore, it seems that the more strongly one identifies with Nieuwland, a sustainable neighbourhood, the more one is already somewhat intrinsically motivated to engage in sustainable energy behaviour. This can explain the positive relationship between group identification with a sustainable neighbourhood and an intrinsic motivation to use smart energy technologies.

An alternative explanation for the direct relationship between group identification and intrinsic motivation is that a confounding third variable plays a role that correlates with our independent variables and group identification, which is responsible for the main effect of group identification on intrinsic motivation. For example, group identification correlated positively with biospheric values ($r = .19, p < .05$), descriptive norm ($r = .27, p < .01$), but mostly with group importance ($r = .52, p < .01$)². This overlap between the constructs might indicate the presence of an unknown third variable that correlates with our predictors (most notably group importance and group identification) and intrinsic motivation. Future research is required to unravel the relationship between these constructs, particularly looking for theoretical overlap between

² We do not expect this correlation to be indicative of multicollinearity as this is normally expected from correlations that are $r = .80$ or higher.

group importance and group identification (see Leach et al., 2008), and test whether third variables can explain the relationship.

Next, in two moderated mediational models we tested whether the effects of descriptive norm, and group importance on the decision to participate in the local energy initiative that promotes the use of smart energy technology would be mediated by intrinsic motivation to use smart energy technology, and whether this mediation effect would be moderated by group identification for the social influence variables. As we found that the effect of descriptive norm on behavioural intentions was not mediated by intrinsic motivation, regardless of the level of identification with the group, the finding was in line with our hypothesis that the relationship between descriptive norms and the decision to join a local energy initiative would unlikely be mediated by intrinsic motivation. We even found that descriptive norms had a negative direct effect on the decision to join the local energy initiative, which warrants caution when using social influence variable to motivate sustainable energy behaviour.

However, contrary to our hypothesis, although the effect of group importance on participation was fully mediated by intrinsic motivation, group identification did not play a significant role as a moderator. This again suggests that group importance had a direct effect on intrinsic motivation, and that identifying with the neighbourhood was not required for group importance to positively affect actual participation in the local energy initiative. We did observe slight differences in the indirect effect of group importance on the decision to join a local energy initiative, as the indirect effect increased slightly with each level of identification with the group (-1SD, mean-level, and +1SD), but these differences were too small to be statistically significant, and we therefore cannot speak of a moderated mediation. So, as previously discussed, it may be that someone who strongly identifies with a sustainable neighbourhood such as Nieuwland is already somewhat intrinsically motivated to engage in sustainable energy behaviour. This can explain the direct positive effect of group identification on intrinsic motivation.

Out of the two ways we operationalized social influence, group importance had a positive effect on intrinsic motivation to use smart energy technology, and

indirectly a positive effect on participation in the local energy initiative that promotes the use of this technology as well, via intrinsic motivation. Furthermore, the model with group importance explained more variance in intrinsic motivation ($R^2 = 35\%$) compared to variance explained by descriptive norm ($R^2 = 26\%$). This is in line with our reasoning that group importance fulfilled more criteria we proposed for fostering intrinsic motivation compared to descriptive norms: conveying issue importance and being formulated with minimal group pressure, in addition to the criterion of behavioural specificity which descriptive norms also fulfilled.

Interestingly, our results imply that intrinsic motivation can be derived both from the group as well as from biospheric values, as we have found main effects of biospheric values, group importance and group identification on intrinsic motivation, however not from descriptive norms. This is in line with the reasoning provided by the self-categorization theory (Turner, 1982; 1987; 1991), that the psychological self can be experienced at both the level of a person and a group. Based on this, we argued that intrinsic motivation can emerge from personal variables such as biospheric values, as well as group variables such as group importance—although a strong identification with the group does not seem to be a requirement. This finding has major implications to how we consider the construct of intrinsic motivation, which has up to now only been defined as being intrinsic to the activity that one engages with, rather than being intrinsic to the self. Yet, we found no support for the hypothesised moderation effect of group identification on the effect of social influence on intrinsic motivation, suggesting that a strong identification with the group is not necessary to foster intrinsic motivation via social influence, a finding also reported in a study by Sloot, Jans and Steg (2018). Future research could explore whether group identification does not moderate the effect of social influence on intrinsic motivation when participants identify strongly with the group and the group is already oriented toward sustainable energy behaviour, as suggested above.

Practically speaking, our results suggest that the perception that your neighbours think it is important to use smart energy technologies (i.e. group

importance) can lead you to think that it is important to use these technologies yourself (i.e. intrinsic motivation), which in turn increases the likelihood that you will join a local energy initiative that promotes the installation and use of smart energy technologies. The fact that group importance had a direct effect on intrinsic motivation to use smart energy technology and an indirect effect on the decision to join a local energy initiative that promotes the use of this technology (independent of the extent one identified with the group) is potentially good news for policy makers, as this means that social influence, and group importance in particular, does not hamper intrinsic motivation but can even strengthen it. This is important because behaviour based on intrinsic motivation is more likely to result in sustained behavioural change. We have shown that social influence is particularly intrinsically motivating when it carries issue importance, when it is conveyed with minimal group pressure, and when it is formulated at the level of behaviour.

Limitations and future research.

The strength of this study is that it is performed among residents of a neighbourhood in which a local energy initiative was about to be formed, set in an environment with real opportunities to install and use smart energy technologies designed to reduce fossil energy use consumption and increase sustainable energy consumption (produced by one's own solar photovoltaic panels). Our sample contained residents from the Nieuwland neighbourhood that decided to join the local energy initiative and install smart energy technology, and a sample of residents from Nieuwland that decided not to join the initiative, which gave us the opportunity to study actual participation behaviour as a dependent variable. Although we are confident that the real-life sample provides results that are more easily generalizable, future research is required to see whether results can be replicated across different demographic groups, neighbourhoods, and cities. This study was performed under a specific setting of relatively affluent residents who already owned rooftop PV and were offered smart energy technology free of charge. Future studies are needed to test whether our finding that intrinsic motivation can be derived from group importance applies to the general population and under different conditions.

The correlational nature of the regression analysis renders it difficult to draw causal conclusions. Even though the mediation analysis gave us more confidence in a causal direction of the relationships, the field study design did not allow us to control all facets of the research in the same way a lab experiment would. Also, the cross-sectional nature of this study may have introduced a common method variance bias (Podsakoff, MacKenzie, & Podsakoff, 2003). To mitigate these issues in future research, we would advise researchers to separate the measurements of independent and dependent variables over time in field studies, or to test the same models in a controlled lab setting (for comparative reference). We would also like to note that some of our self-report scales were based on single items, such as the measures of descriptive norms and group importance. Although this can be seen as a potential psychometric issue, because the reliability of single item scales is both unknown and unknowable, we are not that worried about this issue as research has shown that single item scales can correlate highly with their multi-item counterparts (Wanous, Reichers, & Hudy, 1997; Atroszko, Bagińska, Mokosińska, Sawicki, & Atroszko, 2015). We would like to note that the dependent variable, although a single item, is not a self-report scale but rather a behavioural measurement of whether one is a member of the local energy initiative, or simply a non-member resident of the same neighbourhood. This is a strong and straightforward measure of behaviour.

Finally, although we found no significant effects of descriptive norms on intrinsic motivation, we cannot rule out the fact that a positive relationship between descriptive norms and intrinsic motivation can exist in principle. These are the inherent shortcomings of null-hypothesis tests (Harms & Lakens, 2018). Although the null-hypothesis can never be disproven through statistical sampling methods, Harms & Lakens (2018) provide alternative hypothesis testing methods to consider in future research.

Conclusion.

Our finding that intrinsic motivation can be derived from the group disputes the notion that social influence is de facto extrinsic and therefore could weaken the intrinsic motivation to make pro-environmental choices. Notably, we reasoned and found that intrinsic motivation can be derived from social

influence particularly when three conditions are met. First, it must be clear to the individual which issues are valued as important by the group (issue importance). Second, issue importance needs to be conveyed to the individual with as little group pressure as possible, to allow the individual to freely choose to adopt the issue importance and associated behaviour. Third, issue importance should be formulated at a similar level of specificity as the behaviour itself, to ensure for a smooth and specific transition from social influence to behaviour. We discovered a component of social influence that fits all these criteria: group importance, and found that in our sample, it was a more important source of intrinsic motivation to use of smart energy technology than descriptive norms, as well as biospheric values. Furthermore, we found that group importance predicted participation in a local energy initiative that aims to promote the use of smart energy technology regardless of how strongly the participants identified with their neighbourhood, which is contrary to our hypothesis but interesting as it seems that a high level of group identification is not required for social influence to have a positive effect on intrinsic motivation.

Chapter 3

Internalizing social influence as an intrinsic motivation— a longitudinal field study

The sustainable energy transition requires behavioural change at individual and societal levels. Local energy initiatives are established to accelerate the energy transition by encouraging behaviour change among their members. Such initiatives may be effective because they can promote sustainable energy behaviours among a large group of people through social influence. It is often assumed that social influence is extrinsically motivating, which can inhibit the likelihood of sustained behaviour change. Yet, we argued and found that social influence can enhance one's intrinsic motivation, particularly among those who strongly identify with the group—which in turn stimulates sustainable behaviour. Intrinsic motivation mediated the effect of social influence on sustainable energy intentions particularly when social influence conveyed issue importance, carried minimal group pressure, and was formulated at the level of the specific behaviour being targeted.

To achieve the energy transition from fossil fuels to renewable energy sources, behavioural changes on a large-scale are required. Making the energy transition happen means that consumers need to change their daily energy-use behaviour in a sustainable way. A novel approach to promote sustainable energy behaviour are local energy initiatives, in which people combine efforts to, among others, invest in local renewable energy production, use sustainable energy

technologies, and to reduce fossil energy use (Seyfang & Haxeltine, 2012). Such groups can be a key source of influence that motivate sustainable energy behaviour in the communities in which they are established and are therefore a key theme of our research.

Local energy initiatives may encourage residents to become members and to engage in sustainable energy behaviour via social influence strategies (Cialdini & Trost, 1998). The basic understanding of social influence is that people act out what the group wants in order to gain social acceptance, or to avoid social sanctions (Cialdini & Trost, 1998). This extrinsic view of social influence is rooted in the dual-process theory (Deutsch & Gerard, 1955), which regards groups as external to the self. The approach implies that participating in a local energy initiative would result in extrinsically motivated engagement in sustainable energy behaviour, driven by the desire to avoid social sanctions or to reap social benefits (such as with injunctive norms), rather than an intrinsic motivation to reduce fossil energy use out of a personal sense of importance to do so. The extrinsic view of the group implies that any behavioural change that results from joining a local energy initiative is extrinsically motivated, while people are not expected to reduce fossil energy use out of an intrinsic motivation.

Yet, social influence strategies that produce behaviour that is extrinsically motivated via the prospect of social rewards and/or sanctions implies that it may be less likely that behaviour change will sustain itself over time. Lasting behavioural change in a group setting in which individuals are exposed to social influence is more likely when resulting from an intrinsically motivated decision to act pro-environmentally. Intrinsically motivated behaviour is more likely to be sustained across time and contexts as the motivation comes from within oneself, rather than from extrinsic reinforcement. But can joining a local energy initiative motivate people to reduce their fossil energy use in a sustained way? In other words, can social influence in a local energy initiative foster an intrinsic motivation to use energy more sustainably?

We argue that social influence may not always merely strengthen extrinsic motivation to reduce fossil energy use in the context of a local energy initiative. Our assumption is based on another theoretical perspective on social influence

in the social psychology literature. Notably, according to Turner's self-categorization theory (Turner, 1982; 1987; 1991), the group can be experienced as an extension of the self, particularly when people strongly identify with the group. This reasoning implies that social influence, particularly among those who strongly identify with the group, can intrinsically motivate people to act in line with the group goals.

Self-categorization theory suggests that there is not always a clear distinction between the group (self) and the personal self and states that when people strongly identify with a group, the group goals can be experienced as one's own goals. This emphasizes the "group within the individual" rather than the "individual within the group" as assumed in traditional group dynamics (Turner, 1982). It is plausible to assume that when a local energy initiative is formed around the sense of importance to reduce fossil energy use, this group importance can be internalized into a personal sense of importance of sustainable energy use, which implies that individuals become intrinsically motivated to reduce fossil energy use.

Self-categorization theory expands and transcends the dual-process paradigm (Deutsch & Gerard, 1955) by explaining how the group can be experienced both as external to the self and internal to the self, depending on the extent to which the individual identifies with the group. Specifically, when people strongly identify with the group, group goals are particularly likely to become their own goals. In contrast, when they do not strongly identify with the group, the group goals are likely to remain more extrinsic to the self (i.e. as assumed in the dual process theory). Hence, concerning the question whether intrinsic motivation can result from social influence, we say: "yes, it can", particularly when the individual strongly identifies with the group. What follows from this approach is that people who strongly identify with the group, such as a local energy initiative, can internalize the sense of importance of the group to use energy more sustainably in the self. This means that group identification moderates the extent to which social influence results in more intrinsically motivated sustainable energy behaviour by the individual.

Another important source of intrinsic motivation that has been identified in the environmental domain are biospheric values. Schwartz (1992) defined values as “desirable trans-situational goals varying in importance, which serve as a guiding principle in the life of a person or other social entity” (p. 21). Biospheric values reflect a key concern with the quality of nature and the environment for its own sake (Steg, Perlaviciute, et al., 2014). People may reduce fossil energy use because they derive meaning from acting upon biospheric values as far as these are important to them (De Groot & Steg, 2010). When a certain type of values is important to a person, he or she is likely to feel morally obliged to act upon it, and is internally rewarded for doing so (Lindenberg, 2001a). Indeed, research suggests that acting to benefit the environment feels good, as people derive pleasure and satisfaction from doing the right thing (Bolderdijk et al., 2013; Taufik et al., 2015; Venhoeven et al., 2013, 2016). People experience these intrinsic rewards particularly when they strongly endorse biospheric values (Venhoeven, 2016). Hence, we expect that the sense of importance of using energy sustainably can be derived both from individual factors (notably biospheric values), as well as from group factors (when the group has the goal to use energy more sustainably), particularly among those who strongly identify with the group.

We aim to study whether social influence can be experienced as intrinsically motivating. To test whether social influence strategies can be a complementary source of intrinsic motivation to biospheric values, we examine whether indicators of social influence explain unique variance in intrinsic motivation in addition to the variance explained by biospheric values. In doing so, we test different ways in which social influence related to sustainable energy use can be conveyed within a group. Specifically, we will examine three such routes to social influence in this chapter: descriptive norms (i.e., perception of the sustainable energy behaviour of a group), injunctive norms (the perception that the group expects you to use energy in a sustainable way), and group importance (the extent to which people believe the group values the achievement of a sustainable energy goal); we elaborate on these below. We propose that intrinsic motivation to reduce fossil energy use will be relatively high when the individual has strong

biospheric values, and when the form of social influence scores positively on one or more of the following three dimensions: 1) the importance the group assigns to sustainable energy behaviour is clearly conveyed, 2) minimal group pressure is involved, and 3) issue importance is formulated at the same level of specificity as the behaviour being targeted.

The first criterion for social influence to foster intrinsic motivation is that social influence needs to explicate that the group values a goal, such as the importance of using energy sustainably. That is why we refer to this criterion as ‘issue importance’. The second criterion for fostering intrinsic motivation is that the individual group members feel they are choosing to adopt the issue importance out of their own volition—rather than feeling pressured to do it by the group, which would be an extrinsic motivation. That is why we refer to this criterion as ‘minimal group pressure’. The third criterion for fostering intrinsic motivation is that the group goals that are being conveyed by social influence will most easily translate into behaviour if they are formulated at the same level of specificity as the desired outcome behaviour. That is why we refer to this criterion as ‘behavioural specificity’.

Our assumption that the level of specificity on which the outcome behaviour is formulated matters, is based on the attitude theory that proposes that the attitude-behaviour relationship will be stronger when both are measured at the same level of specificity (Weigel et al, 1974; Stephen & Kraus, 1995). We expect that the same is true for similarity in the focus of the social influence and behaviour being targeted. Moreover, as explained above, we expect group identification to moderate the extent to which social influence can result in more intrinsically motivated behaviour (in line with the self-categorization approach by Turner, 1982; 1987; 1991) or in more extrinsically motivated behaviour (in line with the dual-process approach by Deutsch & Gerard, 1955).

The first form of social influence we discuss in this chapter results from descriptive norms. Descriptive norms are perceptions of which behaviours are typically performed by other group members in a given context (Cialdini & Trost, 1998). We expect that descriptive norms are less likely to foster intrinsic motivation because they do not score positively on all three dimensions

introduced above. First, descriptive norms do not clearly convey the importance of sustainable energy use as they simply denote which behaviour is commonly performed, but do not convey *why* a certain behaviour is commonly performed. Regarding minimal group pressure, descriptive norms may exercise a form of group pressure as the individual might feel unease for behaving differently than the group, even if the reasons for the group behaviour are unknown. With respect to behavioural specificity, since descriptive norms describe observed behaviour, they are (by definition) formulated at the same level of specificity as behaviour. In sum, although descriptive norms are formulated at the level of behaviour, they do not clearly convey issue importance and are likely to induce some group pressure, which makes them less likely to be a source of intrinsically motivated behavioural change.

The second form of social influence we distinguish results from injunctive norms. Injunctive norms reflect perceptions of the extent to which behaviours are typically approved or disapproved of by group members, and thus what is acceptable and unacceptable social behaviour (Cialdini & Trost, 1998). We expect injunctive norms are less likely to foster intrinsic motivation than group importance (but more likely than descriptive norms), because injunctive norms score positively on some, but not all three dimensions. First, injunctive norms are likely to convey the importance of sustainable energy use by making the approval of target behaviour salient (if it is approved, it must be important to the group). Yet, injunctive norms imply social approval and disapproval, which implies that some group pressure is present, which makes it likely that injunctive norms foster extrinsic rather than intrinsic motivation. Regarding behavioural specificity, injunctive norms can be specified at the same level as the behaviour. In sum, although injunctive norms are clearly conveying issue importance and can be formulated at the level of the behaviour at stake, they are less likely to be a source of intrinsically motivated behavioural change.

The third form of social influence we distinguish results from group importance. We define group importance as people's perception that their in-group (in this case the local energy initiative) thinks it is important to use energy sustainably. We expect that group importance is most likely to foster intrinsic

motivation to engage in sustainable behaviour because it scores positively on all three dimensions we listed above (see also Table 3.1 below). First, group importance clearly conveys that a person believes that the group finds it important to reduce fossil energy use. Second, group importance can be conveyed without explicit behavioural expectations, which implies that people are not likely to feel pressured by the group to reduce fossil energy use. Third, group importance is defined at the level of behaviour that is required to change, making it clear to people how to act in line with what they think is important. Table 3.1 summarizes how different types of social influence score on criteria that are important for intrinsic motivation.

Table 3.1

Three criteria that increase the likelihood of social influence fostering intrinsic motivation for individuals that identify with the group

	<i>Issue importance</i>	<i>Minimal group pressure</i>	<i>Behavioural specificity</i>
Group importance	X	X	X
Injunctive norm	X		X
Descriptive norm			X

Note: Biospheric values are excluded from this table as they are not a group-based variable

In addition to the three criteria discussed in the previous paragraphs and summarized in Table 3.1 above, we expect group identification to play a moderating role in the way social influence affects intrinsic motivation (in line with the self-categorization approach by Turner, 1982; 1987; 1991) or extrinsic motivation (in line with the dual-process approach by Deutsch & Gerard, 1955). Any form of social influence may be stronger when individuals more strongly identify with the group. Yet, we expect this moderation effect to be more likely for those types of social influence with more intrinsic properties as summarized in Table 3.1. In our case, we expect the moderation effect to be strongest for group importance. Overall, we expect that more strongly the social influence meets our three criteria, the more likely it is that social influence will foster an

intrinsic motivation to use smart energy technologies—and thereby indirectly influence the decision to join a local energy initiative via an intrinsic motivation, particularly among those who strongly identify with the group.

Subsequently, we expect that the effects of social influence on the intention to reduce one's fossil energy use are likely to be mediated by intrinsic motivation, and that this will more likely be the case for those types of social influence that more fully meet the three criteria (i.e. group importance), and the stronger the individual identifies with the group. When such mediation occurs, we speak of an intrinsically motivated decision to reduce fossil energy use.

We started this chapter by saying that social influence can have an effect (i.e. explain unique variance) on intrinsic motivation, and that this effect will be stronger the more one identifies with a group from which the social influence emerges. Subsequently, we proposed that the effect of social influence on intrinsic motivation will be stronger for those types of social influence that have more intrinsic properties (i.e. meet more of three criteria we listed in Table 3.1). Then, we proposed to test whether this relationship between social influence and intrinsic motivation will hold when controlled for a more established source of intrinsic motivation—biospheric values. Finally, we proposed that the effect of social influence on behaviour—and more specifically the intention to use energy more sustainably—will be mediated by intrinsic motivation, and that this will more likely be the case when one more strongly identifies with the group, and when the type of social influence has more intrinsically motivating properties (i.e. meets the three criteria listed in Table 3.1, such as group importance).

The present study

To test whether social influence would strengthen intrinsic motivation in the present and predict sustainable behavioural intentions in the future, we conducted a two-year longitudinal study (including four questionnaire waves) among members of a local energy initiative. Not only did we test whether biospheric values measured at T0, and group importance, injunctive norms, and group identification measured at T1, and descriptive norms measured at T2, would affect intrinsic motivation measured at T2, but also whether intrinsic motivation measured at T2 would affect sustainable behavioural intentions

measured at T3. This allows us to test whether social influence positively affects intrinsic motivation, whether intrinsic motivation mediates the effects of social influence on behavioural intentions in the future, and whether this mediation is moderated by the extent to which the participants identify with the group from which the influence is perceived.

The first set of hypotheses focus on the possible effects of different types of social influence on intrinsic motivation, whether those effects are moderated by group identification, and whether indicators of social influence explain additional variance in intrinsic motivation in addition to biospheric values. These hypotheses are represented by the conceptual model in Figure 3.1 below. H1: Descriptive norms are least likely to explain unique variance in intrinsic motivation in addition to the variance explained by biospheric values, regardless of how strong the participant identifies with the local energy initiative. H2: Injunctive norms are more likely to explain unique variance in intrinsic motivation to reduce fossil energy use in addition to the variance explained by biospheric values, particularly when participants strongly identify with the local energy initiative. H3: Group importance is most likely to explain unique variance in intrinsic motivation to reduce fossil energy use in addition to the variance explained by biospheric values, particularly for participants that strongly identify with the local energy initiative, because group importance has more properties that enhance intrinsic motivation than injunctive norms (see Table 3.1).

Figure 3.1. Conceptual diagram of the predicted effects of the three social influence variables on intrinsic motivation to reduce one's energy consumption,

which can be moderated by group identification with the local energy initiative. The (moderated) effects of the social influence variables are tested in a same model with the direct effect of biospheric values on intrinsic motivation.

We will also test whether intrinsic motivation to reduce fossil energy use mediates the effect of the social influence variables on the intention to use energy more sustainably. We however do not control for the influence of biospheric values on intrinsic motivation in the moderated mediation models as our statistical tooling (Hayes, 2017) does not allow for that. Hence, the second set of hypotheses focus on possible moderated mediational pathways between the social influence variables, intrinsic motivation, and behavioural intentions, in which group identification is again assumed to moderate the effect of social influence on intrinsic motivation. These hypotheses are represented by the conceptual model in Figure 3.2 below. Specifically, we hypothesise that: H4: the effect of descriptive norms on the intention to use energy more sustainably is least likely to be mediated by intrinsic motivation, regardless of how strong the participant identifies with the local energy initiative. H5: The effect of injunctive norms on the intention to use energy more sustainably is more likely to be mediated by intrinsic motivation, particularly for participants that strongly identify with the local energy initiative. H6: The effect of group importance on the intention to use energy more sustainably is most likely to be mediated by intrinsic motivation, particularly for participants that strongly identify with the local energy initiative. H7: The mediation effect of group importance on behavioural intentions will be stronger than the mediation effect of injunctive norms on behavioural intentions, because group importance has more properties that enhance intrinsic motivation than injunctive norms (see Table 3.1).

Figure 3.2. Conceptual diagram of the predicted moderated mediation of how the effect of the three social influence variables on the behavioural intention to reduce one’s energy use can be mediated by the intrinsic motivation to reduce one’s energy use (which can in turn be moderated by group identification with the local energy initiative).

Method

Procedure.

This study was part of a local energy project—“Smart grid: rendement voor iedereen! (Smart grid: return for all)” —that aimed to test the effects of smart energy systems, an innovation designed to allow people to use energy more sustainably. The project was organized by a consortium of governmental and commercial parties and took place in a residential area, in and around the Nieuwland neighbourhood in Amersfoort, a middle-sized city in the Netherlands. This neighbourhood comprised of single houses equipped with rooftop solar panels; inhabitants were generally families with children. Early 2013, the residents were invited to join the local energy initiative called ‘AmersVolt’, which officially started in September 2013. As an incentive to participate in the initiative, the residents were offered a smart meter, five smart plugs and a home energy management app free of charge, in return for their participation in the project. There was only budget to admit 100 households into the project, so that was the maximum number of research participants who we could label as initiative-joiners.

As part of an evaluation study of a two-year residential smart-grid pilot in the Dutch city of Amersfoort: “Smart grid: rendement voor iedereen! (Smart grid: return for all)”, we conducted a longitudinal questionnaire study among members including four waves: T0 (March–June 2013), T1 (February–March 2014), T2 (June–July 2014), and T3 (November–December 2014). The smart grid project ran from September 2013 to March 2015. We had the opportunity to conduct a baseline questionnaire among participants that signed up for the initiative in the Spring of 2013, before the official project kick-off in the Fall of 2013. We however must note that a small minority of participants ($n = 10$) that participated in the baseline questionnaire conducted a pen-and-paper version that questionnaire a year earlier. They were part of randomly selected sample of Nieuwland residents that participated in an earlier questionnaire study in the Fall of 2012, prior to the announcement of the local energy initiative, that included the same items relevant for our study, making it possible to test our theorizing.

The aim of the project was to roll-out and test the effects of smart energy technologies on household energy behaviour. The technologies included a smart meter, a home energy management system (HEMS), and web-based feedback tools aimed to promote sustainable energy use and to shift the time-of-use to daytime hours in which the PV panels are producing most sustainable energy. One hundred households with rooftop PV from the Dutch city of Amersfoort signed up to participate in the project. A local initiative “AmersVolt” was formed, of which each participant was a member. Members of AmersVolt attempted to reduce their fossil energy use by both reducing and shifting their household energy consumption using the technologies provided by the project, and by sharing energy saving tips among each other. To facilitate this information sharing, the project organized quarterly meetings during which AmersVolt members could get to know each other and exchange their experiences with efforts to reduce their fossil energy use. The meetings were also used by the project team to present preliminary research outcomes. Furthermore, AmersVolt offered its members discounts for the purchase of LED lights, smart washing machines, energy-efficient boilers and heating pumps for underfloor heating systems.

We measured biospheric values at T0 before the project started as a predictor of pro-environmental intrinsic motivation. We measured the group importance, injunctive norm, and group identification at T1, five months after the AmersVolt group was formed. Descriptive norm and intrinsic motivation were measured three months later at T2. Finally, intention to reduce energy use was measured four months later, towards the end of the project at T3.

Participants.

The study was conducted among the 100 total members of the AmersVolt energy initiative who were asked to participate in the four questionnaire waves in the period between 2013 to 2015. Although all respondents were invited to participate in our questionnaire studies at each of the four waves, not all participants completed all questionnaires. T0 had 77 valid responses ($M_{age} = 49$, $SD = 10$, 85% male); T1 had 46 valid responses ($M_{age} = 52$, $SD = 11$, 88% male); T2 had 60 valid responses ($M_{age} = 51$, $SD = 10$, 88% male); and T3 had 34 valid responses ($M_{age} = 54$, $SD = 11$, 84% male)³. The analyses in the Result section have smaller sample sizes than the maximum number of valid participants of each wave because our requirement was that all participants included in the analyses should have participated in all questionnaire waves.

Measures.

T0 (March–June 2013).

Values were assessed by means of a short version of Schwartz's value scale (de Groot & Steg, 2008). The scale has extensively been tested and validated in various studies (de Groot & Steg, 2007, 2008, 2010; Steg, de Groot, Dreijerink, Abrahamse, & Siero, 2011; Steg, Dreijerink, & Abrahamse, 2005; Steg et al., 2014). The extended value scale included 16 values (Steg et al., 2014), including 4 biospheric value items: 'respecting the earth', 'unity with nature', 'protecting the environment', 'preventing pollution'. Following (Schwartz, 1992), respondents rated the importance of these values "as guiding principles in their lives" on a

³ The number of valid participants we report in our Results section is lower than the sample size of the individual waves because the models tested comprised participant data from different questionnaire waves. We could only include participants that had completed all the variables we measured across the different waves.

9-point scale ranging from -1 = opposed to my principles, 0 = not important to 7 = extremely important. Respondents were urged to vary the scores and to rate only few values as extremely important. The mean score on biospheric values was $M = 4.51$ ($SD = 1.28$, $\alpha = .87$).

T1 (February–March 2014).

Group importance was measured with a single item: ‘AmersVolt members think it is important to use as little (fossil) energy as possible’ (1 = Completely disagree, 7 = Completely agree, $M = 4.87$, $SD = 1.15$).

Injunctive norm was measured with a single item: ‘AmersVolt members think it is important that I use as little (fossil) energy as possible’ (1 = Completely disagree, 7 = Completely agree, $M = 4.43$, $SD = 1.20$).

Group identification with the local initiative was measured with six items from the In-group Identification scale (Leach et al., 2008): ‘I feel a bond with AmersVolt’, ‘I feel committed to AmersVolt’, ‘I am glad to participate in AmersVolt’, ‘I think that AmersVolt participants have lot to be proud of’, ‘I often think about the fact that I participate in AmersVolt’, ‘My participation in AmersVolt is an important part of how I see myself’ (1 = Completely disagree, 7 = Completely agree, $M = 4.00$, $SD = 1.05$, $\alpha = .86$).

T2 (June–July 2014).

The descriptive norm was measured with a single item: ‘How many AmersVolt members do you think are seriously trying to reduce their household energy consumption?’ (1 = 0%, 2 = 15%, 3 = 30%, 4 = 45%, 5 = 60%, 6 = 75%, 7 = 90%; $M = 4.28$, $SD = 1.24$).

Intrinsic motivation was measured with a single item: ‘How important is it for you to reduce your energy consumption?’ (1 = Not important at all, 7 = Extremely important, $M = 4.55$, $SD = 1.62$).

T3 (November–December 2014).

The intention to reduce energy use was measured with a single item: ‘To what extent do you intend to reduce your energy consumption now?’ (1 = Not at all, 7 = Very much, $M = 5.65$, $SD = 1.07$).

Data analyses.

To test hypotheses 1 to 3, we performed regression analyses in which we tested the effects of biospheric values, the different social influence variables, group identification, and the interaction of social influence and identification on intrinsic motivation. To successfully calculate the interaction effect, we centered all variables at their means prior to the analysis. To test the effect of each form of social influence on intrinsic motivation, and compare it to the effect of biospheric values, we tested each hypothesis in a separate model. To test the hypotheses 4 to 7, we performed moderated mediation analyses (Model 7) using the PROCESS Macro for SPSS by Hayes (2017) for each type of social influence separately.

Results**The relationship between biospheric values (T0), descriptive norm (T2) and group identification (T1) with intrinsic motivation (T2).**

We examined the effects of descriptive norm, group identification, and their interaction on intrinsic motivation to reduce energy use vis-a-vis the influence of biospheric values. We found that biospheric values, descriptive norm, group identification, and the interaction of descriptive norm and group identification explained 22% of the variance in intrinsic motivation to reduce energy use ($F(4,37) = 2.63, p = .05$). As can be seen in Table 3.2, only the main effect of biospheric values is significant, while the main effects of descriptive norm, group identification, and the interaction effect of descriptive norm and group identification are not significant. These results imply that only biospheric values explain unique variance in intrinsic motivation, while social influence in the form of descriptive norm does not. Specifically, stronger biospheric values are associated with a stronger intrinsic motivation to reduce energy use. These results are in line with H1: descriptive norms are least likely to explain unique variance in intrinsic motivation in addition to the variance explained by biospheric values, regardless of how strong the participant identifies with the local energy initiative, as descriptive norms explained no unique variance in intrinsic motivation to reduce energy use in addition to the variance explained by biospheric values.

Table 3.2

Regression Analysis for the Model of Biospheric values, Descriptive norm, Group identification, and the Interaction of Descriptive norm and Group Identification Predicting Intrinsic Motivation to Reduce Energy Use (N = 41)

Variable	<i>B</i>	<i>SE B</i>	β
Biospheric values	0.49	0.20	.36*
Descriptive norm	0.25	0.19	.20
Group identification	-0.18	0.19	-.13
Descriptive norm x Group identification	0.25	0.14	.27

* $p < .05$.

The relationship between biospheric values (T0) injunctive norm (T1) and group identification (T1) with intrinsic motivation (T2).

Biospheric values, injunctive norm, group identification, and the interaction of injunctive norm and group identification explained 46% of the variance in intrinsic motivation ($F(4,37) = 8.00, p < .001$). As can be seen in Table 3.3, the main effects of biospheric values, injunctive norm, and group identification are significant, while the interaction effect of injunctive norm and group identification is not. These results suggest that both biospheric values and injunctive norm explain unique variance in intrinsic motivation to reduce energy use, independently from each other. Specifically, stronger biospheric values and a stronger injunctive norm are associated with a stronger intrinsic motivation to reduce energy use. Also, a weaker group identification is associated with a stronger intrinsic motivation to reduce energy use in this model. This means we found partial support for H2: injunctive norms are more likely to explain unique variance in intrinsic motivation to reduce fossil energy use in addition to the variance explained by biospheric values, particularly when participants strongly identify with the local energy initiative. Interestingly, a weaker group identification was related to a stronger intrinsic motivation to reduce energy use.

Table 3.3

Regression Analysis for the Model of Biospheric values, Injunctive norm, Group identification, and the Interaction of Injunctive norm and Group Identification Predicting Intrinsic Motivation to Reduce Energy Use (N = 41)

Variable	<i>B</i>	<i>SE B</i>	β
Biospheric values	0.54	0.17	.40**
Injunctive norm	0.72	0.16	.62***
Group identification	-0.43	0.18	-.33*
Injunctive norm x Group identification	0.17	0.12	.18

* $p < .05$. ** $p < .01$. *** $p < .001$.

The relationship between biospheric values (T0), group importance (T1) and group identification (T1) with intrinsic motivation (T2).

We found that the model of biospheric values, group importance, group identification, and the interaction of group importance and group identification explained 38% of the variance in intrinsic motivation to reduce energy use ($F(4,37) = 5.76, p = .001$). Table 3.4 shows that the main effect of biospheric values is not statistically significant, while the main effects of group importance and group identification are. This means that the more people believe that initiative members think using as little fossil energy as possible is important, and the more they identify with the energy initiative, the stronger their intrinsic motivation is to reduce their energy use. More importantly, the interaction effect of group importance and group identification is also a significant predictor of intrinsic motivation to reduce energy use. Simple slopes revealed that the effect of group importance on intrinsic motivation was positive and significant at +1 SD level of identification ($b = .97, p < .001$), while it was not statistically significant at -1 SD level of identification ($b = .39, p = .10$). This means that believing that initiative members think using as little fossil energy as possible is important is associated

with a stronger intrinsic motivation to reduce energy use, particularly among those that strongly identify with the initiative. In short, these results suggest that group importance is particularly associated with intrinsic motivation for high identifiers, while this is not the case for low identifiers. This means we found partial support for H3: group importance is most likely to explain unique variance in intrinsic motivation to reduce fossil energy use in addition to the variance explained by biospheric values, particularly for participants that strongly identify with the local energy initiative, because group importance has more properties that enhance intrinsic motivation than injunctive norms. The hypothesis is only partially supported because biospheric values did not significantly explain intrinsic motivation to reduce energy use when group importance, identification with the smart energy initiative, and their interaction were included in the model. Therefore, instead of group importance explaining variance in addition to the variance explained by biospheric values, group importance, group identification, and the interaction effect of group importance and group identification explained all significant variance in intrinsic motivation in this model.

Table 3.4

Regression Analysis for the Model of Biospheric values, Group Importance, Group identification, and the Interaction of Group Importance and Group Identification Predicting Intrinsic Motivation to Reduce Energy Use (N = 41)

Variable	<i>B</i>	<i>SE B</i>	β
Biospheric values	0.27	0.19	.20
Group importance	0.68	0.20	.55**
Group identification	-0.49	0.21	-.38*
Group importance x Group identification	0.28	0.13	.32*

* $p < .05$. ** $p < .01$.

The moderated mediation analysis of descriptive norm (T2), group identification (T1), intrinsic motivation (T2), and behavioural intentions (T3).

When explaining intention to reduce energy use, descriptive norm, group identification, and the interaction of descriptive norm and group identification did not explain a significant proportion of the variance in intrinsic motivation ($F(3,22) = .53, p = .66$), probably because of the reduced sample size. Furthermore, we found that intrinsic motivation did not mediate the relationship between descriptive norm and the intention to reduce energy use. The indirect effect from the bootstrap analysis was not statistically significant for all levels of group identification. The direct effect ($c = -.05$) was not significant either, so this was a non-effect, non-mediation (Zhao, Lynch, & Chen, 2010). This means that we found no evidence that the effect of descriptive norms on the intention to use energy more sustainably was mediated by intrinsic motivation, regardless of how strong the participant identifies with the local energy initiative (which is in line with H4).

The moderated mediation analysis of injunctive norm (T1), group identification (T1), intrinsic motivation (T2), and behavioural intentions (T3).

When explaining intention to reduce energy use, injunctive norm, group identification, and the interaction between injunctive norm and group identification explained 43% of the variance in intrinsic motivation ($F(3,22) = 5.43, p < .01$). The main effect of injunctive norm on intrinsic motivation was significant ($b = .70, p < .01$), but the main effect of group identification ($b = -.20, p = .52$) and the interaction effect of injunctive norm and group identification were not ($b = .29, p = .11$).

Next, we found that intrinsic motivation mediated the effect of injunctive norm on the intention to reduce energy use for those participants with mean to high levels of group identification with the local energy initiative. Despite the interaction effect of injunctive norm and group identification not being a significant predictor of intrinsic motivation, following the PROCESS analysis, we found that the indirect effect of injunctive norm on the intention to reduce

energy use was significantly higher at both the mean level of group identification ($a \times b = .23$), with the 95% confidence interval ranging from .0050 to .5421, and at the +1 SD level of group identification ($a \times b = .33$), with the 95% confidence interval ranging from .0684 to .7666. This means that the effect of injunctive norm on behavioural intentions is mediated by intrinsic motivation for mean-level identifiers and more strongly so for high identifiers, but not at all for low identifiers. In the indirect path, a unit increase in injunctive norm increased intrinsic motivation by $a = .70$. Holding injunctive norm constant, one unit increase in intrinsic motivation increased the intention to reduce energy use by $b = .30$. The direct effect ($c = -.15$) was not significant, so this was an indirect-only mediation (Zhao et al., 2010). This means we found support for H5: the effect of injunctive norms on the intention to use energy more sustainably is more likely to be mediated by intrinsic motivation, particularly for participants that strongly identify with the local energy initiative.

The moderated mediation analysis of group importance (T1), group identification (T1), intrinsic motivation (T2), and behavioural intentions (T3).

When explaining intention to reduce energy use, group importance, group identification, and the interaction of group importance and group identification explained 33% of the variance in intrinsic motivation to reduce energy use ($F(3,22) = 3.64, p = .03$). The main effect of group importance on intrinsic motivation was significant ($b = .65, p = .04$), while the main effect of group identification was not significant ($b = -.39, p = .30$). The predicted interaction of group importance and group identification approached significance ($b = .31, p = .06$).

Next, we found that intrinsic motivation mediated the effect of group importance on the intention to reduce energy use for those participants with mean to high levels of group identification with the local energy initiative. Despite the interaction effect of group importance and group identification not being a significant predictor of intrinsic motivation, following the PROCESS analysis, we found that the indirect effect of group importance on the intention to reduce energy use was significantly higher at both the mean level of group

identification ($a \times b = .19$), with the 95% confidence interval ranging from .0072 to .5772, and at the +1 SD level of group identification ($a \times b = .28$), with the 95% confidence interval ranging from .0278 to .8184. This means that the effect of group importance on behavioural intentions is mediated by intrinsic motivation for mean-level identifiers and more strongly so for high identifiers, but not for low identifiers. In the indirect path, a unit increase in group importance increased intrinsic motivation by $a = .65$. Holding group importance constant, one unit increase in intrinsic motivation increased the intention to reduce energy use by $b = .27$. The direct effect ($c = -.09$) was not significant, so this was an indirect-only mediation (Zhao et al., 2010). This means that we found empirical support for H6: the effect of group importance on the intention to use energy more sustainably is most likely to be mediated by intrinsic motivation, particularly for participants that strongly identify with the local energy initiative.

Furthermore, we found no evidence to support H7: the mediation effect of group importance on behavioural intentions will be stronger than the mediation effect of injunctive norms on behavioural intentions (because group importance has more properties that enhance intrinsic motivation than injunctive norms), as the indirect mediation effect of group importance on behavioural intentions was not statistically significantly stronger than the indirect mediation effect of injunctive norms on behavioural intentions. The indirect effect of group importance on behaviour at the +1 SD level of group identification was ($a \times b = .28$), with the 95% confidence interval ranging from .0278 to .8184. While the indirect effect of injunctive norm on behaviour at the +1 SD level of group identification was ($a \times b = .33$), with the 95% confidence interval ranging from .0684 to .7666. The difference between the means is .05 with the 95% confidence interval of the difference ranging from -.0406 to .518. As the confidence interval of the difference contains zero, the difference between the two indirect effects is not statistically significant. We therefore cannot conclude that the indirect effect of group importance is stronger than the indirect effect of injunctive norms.

Discussion

The sustainable energy transition requires substantial changes in behaviour, foregoing fossil energy sources as much as possible for sustainable ones and

reducing overall energy consumption. Our research was conducted in a local energy initiative facilitated by a smart grid project with the aim to accelerate the energy transition by offering people smart energy technologies free of charge, in exchange for their participation in the initiative and the accompanying research. We set out to study how different types of social influence would affect people's intrinsic motivation to reduce their energy consumption, and how intrinsic motivation in turn would affect intention to reduce their energy consumption in the future. It is often assumed that social influence is extrinsically motivating and therefore an inadequate source of sustained behavioural change. Yet, we theorized that social influence can enhance intrinsic motivation, particularly when it meets the following three criteria: when social influence conveys issue importance, carries minimal group pressure, and is formulated at the level of behaviour—particularly for those people that strongly identify with the group. We further reasoned that intrinsic motivation could mediate the effect of social influence variables on behavioural intentions to reduce one's energy consumption—particularly when social influence met the three criteria mentioned above and when the individual identified with the group.

We indeed found that social influence could enhance intrinsic motivation to reduce one's energy use, but not for all forms of social influence. We found this to be the case for injunctive norms and group importance, but not for descriptive norms. This result was according to our expectations, as we expected mostly injunctive norms and group importance to have an effect on intrinsic motivation, because they fulfilled more of the three criteria we proposed. Furthermore, we expected that the effects of social influence on intrinsic motivation would be moderated by group identification, and we found that this only applied to the effect of group importance on intrinsic motivation. We will discuss the results and implications of each analysis below.

We first analysed to what extent a descriptive norm, an injunctive norm, and group importance to reduce energy use would affect the intrinsic motivation of initiative members to reduce energy use, in addition to biospheric values, particularly for those that strongly identified with the group. We found that injunctive norms had a main effect on intrinsic motivation, in addition to the

main effect of biospheric values, while we observed no significant effect of descriptive norms on intrinsic motivation. There was however a marginally significant interaction effect of group identification and descriptive norms on intrinsic motivation ($p = .08$). The question remains whether descriptive norms would have been positively related to intrinsic motivation to reduce energy use for high identifiers if the sample size had been larger.

These results could mean that even when not all three criteria for fostering intrinsic motivation are met, social influence can have a positive effect on intrinsic motivation. Moreover, the effect of social influence on intrinsic motivation seems not to be moderated by group identification for all of these social influence variables. For example, injunctive norms explained *unique* variance in intrinsic motivation—in addition to the unique variance explained by biospheric values—meaning that they explained additional variance in intrinsic motivation in addition to biospheric values. This suggests that injunctive norms are a different source of intrinsic motivation than biospheric values, as their effect on intrinsic motivation was at least partly independent from the effect of biospheric values.

Importantly, we found that in the model including biospheric values, group importance, and group identification, the interaction effect of group importance and group identification explained significant variance in intrinsic motivation, while the main effect of biospheric values was non-significant in that model. This confirms the interaction effect we expected for group importance, but not the part of the hypothesis that expects *additional* unique variance to be explained by group importance compared to biospheric values. Indeed, the main effect of biospheric values on intrinsic motivation was non-significant when group importance, group identification and their interaction were included in the model, while biospheric values did explain unique variance in intrinsic motivation in addition to injunctive and descriptive norms. These results suggest that group importance, group identification and their interaction are an important source of intrinsic motivation, which seems to overlap with the impact of biospheric values on intrinsic motivation. Quite possibly, in the group setting of a local energy initiative, the interaction effect of group importance and group

identification could even be a more salient (or proximal) source of intrinsic motivation compared to biospheric values.

The fact that the main effect of biospheric values was non-significant in the model with group importance and group identification may actually be the reason why this model explained less variance in intrinsic motivation than the model of biospheric values, injunctive norms, and group identification. When more predictors explain unique variance in the model, the total model is more likely to explain more variance (i.e. has a larger R^2). Biospheric values did not explain unique variance in the model with group importance and group identification, suggesting that biospheric values did not contribute in the total variance explained by that model. However, the model with group importance explaining less total variance in intrinsic motivation than the model including injunctive norm does not mean that group importance has a less interesting story to tell than descriptive or injunctive norms.

What we learned from these results is that the main issue is not that one type of social influence explained more variance in intrinsic motivation, but that different types of social influence can explain different *types* of variance in intrinsic motivation. Injunctive norms explained additional variance compared to biospheric values, suggesting this form of social influence provides a different route to intrinsic motivation which is partly complementary to biospheric values route. While group importance provides a route to intrinsic motivation that seems to overlap with the biospheric values route—for those that strongly identify with the group. Given the fact that biospheric values are not a significant predictor in the model with group importance and group identification, it seems that in the context of this local energy initiative, the interaction of group importance and group identification proved a more important source of intrinsic motivation compared to biospheric values. The interpretation that the *same* kind of intrinsic motivation can be derived from both the group and the self is further supported by the fact that the correlation between group importance and biospheric values was non-significant ($r = .06$, $p = .70$), which rules out the alternative explanation that the overlap in variance explained in intrinsic

motivation by group importance and biospheric values is due to a strong correlation between these constructs.

These outcomes further suggest that injunctive norms can affect intrinsic motivation irrespective of the level of group identification, parallel to the effect of biospheric values. However, since the variance explained by injunctive norms is different (and additional to) the variance explained by biospheric values, this also indicates that injunctive norms explain a different part of intrinsic motivation than biospheric values do. This means that even when not all three criteria for fostering intrinsic motivation are fulfilled, social influence can have a positive effect on intrinsic motivation, but that in this case social influence is not likely to be moderated by group identification. However, this claim can be invalidated if it turns out that we did not find an interaction effect between descriptive norms and group identification on intrinsic motivation because of a low (i.e. underpowered) sample size. Future research is required to further test these claims.

We then examined whether intrinsic motivation could mediate the effect of descriptive norm, injunctive norm, and group importance on the intention to reduce one's energy use, and whether this mediation effect would be moderated by group identification. We found no evidence that the effect of descriptive norm on behavioural intentions was mediated by intrinsic motivation, regardless of the level of identification with the local energy initiative, which is in line with H4. We found that the effect of injunctive norm on behavioural intentions was mediated by intrinsic motivation for mean- and high-level identifiers, confirming H5, which suggests that injunctive norms seem to affect behaviour via intrinsic motivation, although the interaction effect of injunctive norm and group identification on intrinsic motivation was non-significant in the first step of the mediation analysis. Yet, these results should be interpreted with care, as they are inconsistent across the mediation analysis steps and based on a small sample size. Also, the effect of group importance on behavioural intentions was mediated by intrinsic motivation for mean- and high-level identifiers, but not for low identifiers, confirming H6. Finally, the indirect effect of group importance on behavioural intentions did not prove to be statistically significantly different

from the indirect effect of injunctive norms on behavioural intentions, which was not in accordance with H7, suggesting that the indirect effects of group importance and injunctive norms on the intention to reduce energy use were equally strong, particularly for those that strongly identified with the local energy initiative.

The finding that intrinsic motivation mediated the effect of both injunctive norms and group importance on intention to reduce energy use for mean- and high-level identifiers could mean that intrinsic motivation could be derived from variables that imply some group pressure, such as injunctive norms. The positive effect of injunctive norm on intrinsic motivation may not be so surprising for high identifiers as they are arguably less likely to experience this norm as group pressure (because it comes from within their group). The finding that both group importance and injunctive norms were positively related to intrinsic motivation may also be due to our operationalization of injunctive norm, which was in some respect similar to the operationalization of group importance, stressing the importance of energy saving. However, due to the small sample sizes we had at our disposal in the field studies, these findings should be interpreted carefully.

Specifically, we conceptualised group importance as: 'AmersVolt members think it is important to use as little (fossil) energy as possible'. While we conceptualized injunctive norm as: 'AmersVolt members think it is important that I use as little (fossil) energy as possible', which is different from group importance by referencing the expectation of the group to the self. This may have been a far too subtle difference in operationalization between group importance and injunctive norm, and could have stressed the group expectation laden with group approval/disapproval if it were formulated like: 'AmersVolt members would approve if I used as little (fossil) energy as possible', or 'AmersVolt members would disapprove if I used a lot of fossil energy'. Future research could opt for another conceptualisation of injunctive norm, to examine the conditions under which injunctive norms can (or cannot) foster intrinsic motivation, and whether this in turn promotes intention to use less energy.

Overall, our findings suggest that social influence can be an additional source of intrinsic motivation in addition to biospheric values, as we found direct

effects of injunctive norms on intrinsic motivation, in addition to the direct effect of biospheric values. We found group importance to be particularly a source of intrinsic motivation for those who strongly identified with the group. Moreover, we found that variance explained in intrinsic motivation by biospheric values was superseded by the interaction effect of group importance and group identification—the consequence of which is that the total variance explained in intrinsic motivation in this model was lower than in the model with injunctive norms, as the models with injunctive norms explained additional unique variance to the variance explained by biospheric values.

The fact that biospheric values were not a significant predictor of intrinsic motivation in the model with group importance and group identification suggests that for high identifiers, group importance can become a more important source of intrinsic motivation than biospheric values, while this is not the case for injunctive norms. Furthermore, this effect cannot be explained by a correlation between group importance and biospheric values as this correlation proved non-significant. The finding that injunctive norms had a significant direct effect on intrinsic motivation means that some unique variance in intrinsic motivation is explained by this variable, although via a different process than the effect of group importance for high-identifiers, suggesting that injunctive norms influence a different type of intrinsic motivation that is complementary to the intrinsic motivation derived from biospheric values. While group importance for high identifiers influences a similar type of intrinsic motivation that biospheric values do, which makes sense according to our theorizing that for high identifiers, group goals can be perceived as one's own. Surprisingly, in both the models with injunctive norms and group importance, group identification had a significant negative main effect on intrinsic motivation as well. We do not have a theoretical explanation for this finding. Future research is required to examine this further.

Limitations and future research.

The strength of this study is that it was conducted among residents and participants in a local energy initiative, in an environment with real opportunities to engage in behaviour that would reduce fossil energy use and increase energy

saving behaviours. The limitation of this project was that the total sample size was capped to one hundred participants, as only that many smart meters and home energy management devices were funded and installed in the pilot. As is common in field research, due to participant attrition over time, sample sizes were smaller in subsequent phases in the project. This also affected the number of valid participants we could use in our models in which we included data from different questionnaire waves, particularly as we had to exclude a substantial proportion of participants that did not fill out all questionnaires. The small sample size and participant attrition over time could explain why some results were statistically non-significant such as the finding that group identification did not moderate the effect of injunctive norm on intrinsic motivation in the first part of the mediation analysis (H6). Our model tests are therefore conservative.

Furthermore, although the correlational nature of the regression analysis renders it difficult to draw causal conclusions with confidence, we measured the independent and dependent variables at different points in time to give us more confidence in the causal interpretation of our findings. Even though the mediation analysis with a longitudinal component gave us more confidence in a directional interpretation of our hypothesis, our field study did not allow us to control all facets of the research in the same way a lab experiment would. We would advise future research to test our models in a lab setting.

Although we are confident that the real-population sample provides results that are more easily generalizable, future research is needed to see whether results can be replicated across different demographic groups, neighbourhoods, and cities. This study was performed under a specific setting of relatively wealthy residents who already owned rooftop PV and were offered smart energy technologies free of charge, with most of the participants responding to the questionnaires being male. Future studies are needed to test whether similar results that social influence can positively affect intrinsic motivation and produce lasting behavioural change would be found in a sample more closely representing the general population.

We would also like to note that most of the self-report measures in this study were based on single items, such as the measures of injunctive norms,

descriptive norms, group importance, intrinsic motivation, and the dependent variable of the intention to reduce one's energy use. Although this can be seen as a potential psychometric issue, because the reliability of single item scales is both unknown and unknowable, we are not that worried about this issue as literature has shown that single item scales can correlate highly with their multi-item counterparts (Wanous, Reichers, & Hudy, 1997; Atroszko, Bagińska, Mokosińska, Sawicki, & Atroszko, 2015).

Finally, although we found no significant effects of descriptive norms on intrinsic motivation, we cannot rule out the fact that a positive relationship between descriptive norms and intrinsic motivation can exist in principle. These are the inherent shortcomings of null-hypothesis tests (Harms & Lakens, 2018). Although the null-hypothesis can never be disproven through statistical sampling methods, Harms & Lakens (2018) provide alternative hypothesis testing methods to consider in future research.

Conclusion.

Our finding that intrinsic motivation can be derived from the group challenges the notion that social influence is *de facto* extrinsic (i.e. because it derives from outside the self) and therefore a force that weakens the intrinsic motivation to make pro-environmental choices. Notably, we reasoned and found that intrinsic motivation can be derived from the group, because this allows for the integration of the group (and its goals) in the self, as proposed in self-categorization theory (Turner, 1982; 1987; 1991).

We outlined three conditions that increase the likelihood of social influence fostering intrinsic motivation. First, it must be clear to the individual group member which issues are valued as important by the group (issue importance). Second, issue importance needs to be conveyed to the individual with as little group pressure as possible, to allow the individual to freely choose to adopt the issue importance and associated behaviour. Third, issue importance should be formulated at a similar level as the behaviour itself, to ensure for a smooth and specific transition from issue importance to behaviour.

A component of social influence that fits all these criteria, group importance, appeared to be a more critical source of intrinsic motivation than biospheric

values for those that strongly identified with the group. Interestingly, injunctive norms positively affected intrinsic motivation alongside biospheric values, irrespective of the level of identification with the group, which suggests that social influence can be intrinsically motivating without needing to fulfil all the criteria we suggested. However, group identification seems to play an important role for group importance to have an effect on intrinsic motivation, and for the effects of both group importance and injunctive norms on behavioural intentions to be mediated by intrinsic motivation.

Chapter 4

Solving the surveillance dilemma for pro-environmental behaviour—the power of ingroup goals

Policy makers often employ extrinsic social rewards and punishments to promote behaviours that serve group interests, such as pro-environmental behaviour. Surveillance is one such classic means to encourage positive behaviour. However, these strategies are costly and can backfire if by encouraging extrinsic motivation, they alienate those who would otherwise perform the behaviour of their own volition: the “surveillance dilemma.” We propose a novel route to pro-environmental behaviour, targeting intrinsic motivation at the group level, to overcome individual interest and extrinsic motivation. We investigated the role of surveillance in motivating renewable energy production in two experiments designed to incur individual effort (on a rowing machine) towards a group goal. Results confirm the double-edged nature of surveillance: it increased effort when present, but reduced effort when removed. An ingroup goal motivated people to sustain their effort investment toward a group goal, even when surveillance was used and subsequently removed.

Social sciences can play a prominent role in achieving a sustainable energy transition (Sovacool, 2014; Weaver et al., 2014). Fossil fuel consumption is the primary driver of anthropogenic climate change (IPCC, 2014); about one-third of fossil fuel consumption in the US and Europe relates to household energy

use (Dietz, Gardner, Gilligan, Stern, & Vandenberg, 2009; Eurostat, 2017). Hence, anthropogenic climate change can be significantly reduced if more people engaged in sustainable energy behaviour. Fostering sustainable energy behaviour is the focus of this chapter.

Pro-environmental behaviour contributes to a collective goal (i.e. saving the environment), often at some personal cost (i.e. an investment of money or behavioural effort) (Hardin, 1968). Policy makers typically seek to solve this dilemma by incentivizing sustainable behaviour, or enforcing it by means of surveillance. However, these strategies are relatively costly and inefficient as they target individuals' extrinsic motivation to act sustainably, thereby running the risk that people only engage in sustainable behaviour as long as incentives or enforcements are present (Bolderdijk, Knockaert, Steg, & Verhoef, 2011; Van der Linden, 2015). Worse still, social reinforcement by means of surveillance may undermine intrinsic motivation to behave sustainably, which is an important source of durable sustainable actions. This suggests that surveillance strategies can backfire when removed by alienating people who would otherwise care about the group interest of their own volition; we aim to study whether this is the case.

When people are intrinsically motivated (Deci, Koestner, & Ryan, 1999), they act sustainably also in the absence of incentives or surveillance. Intrinsic motivation is an important predictor of pro-environmental behaviour (Steg, Bolderdijk, Keizer, & Perlaviciute, 2014; Steg, Perlaviciute, & van der Werff, 2015; Cooke, Fielding, & Louis, 2015). According to Deci and Ryan (1985) intrinsic motivation manifests itself through "self-determined" behaviour. Because the *self* is typically defined at the level of the individual (also in Self-Determination Theory), intrinsic self-interest could be set in contrast to a group goal. The key challenge therefore is to seek a way to render the group interest as internal to the individual.

A key obstacle to this challenge concerns the traditional view of the group as external to self. This is the mainstream conceptualization of the group in the group dynamics literature (Deutsch & Gerard, 1955): group pressure evokes compliance to achieve benefits and avoid costs, thereby targeting extrinsic motivation. According to this approach, individuals would contribute to a group

goal only if socially sanctioned. An alternative view is offered by self-categorization theory (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987) in which the group is seen as part of self: groups to which we belong, especially when we identify with them, become internalized. Due to this internalization, group interest can be experienced as self-interest, the more one identifies with the group. This idea is promising because it suggests that in such cases incentives or surveillance may not be necessary to motivate sustained pro-environmental behaviour, as people will feel motivated to contribute to an ingroup goal (i.e. a goal of a group they identify with) of their own volition, even when contributions require some effort.

Furthermore, our scope is not only to test whether ingroup goals are enough to motivate sustained behavioural change, but also to test whether the (intrinsically) motivating effects of ingroup goals are resilient to extrinsic pressures such as surveillance. Specifically, when the extrinsic effect of surveillance and the intrinsic effect of an ingroup goal are combined, will they independently affect behaviour such that a performance increase due to surveillance will be lost once surveillance is removed, and would a performance increase due to an ingroup goal be retained after the removal of surveillance? Or will the use of surveillance externalize all motivation to contribute toward a group goal, even when that goal comes from the ingroup?

Present study

In this study, we will explore whether investing effort in a group goal can be intrinsically motivated by different forms of social influence (operationalized in the experiment as group goals and surveillance), or whether social influence strategies will de facto result in temporary behavioural change based on extrinsic motivation. We will operationalize intrinsic motivation as the voluntary behavioural effort exerted on an energy production task performed on a rowing machine. The energy production task will take place over three repeated measurements which will allow us to have a baseline measure of effort exertion, followed by a measure subject to the manipulation of ingroup vs. outgroup goal, and surveillance vs. no surveillance, followed by a final post-manipulation measure in which surveillance and mentions of group goal are removed. If the

energy production behaviour is increased on the second measurement and retained voluntarily (i.e., when surveillance is removed) on the third measurement, we will speak of intrinsic motivation and lasting behavioural change. If the energy production behaviour is increased in the presence of surveillance on the second measurement, but drops to baseline level when surveillance is no longer present on the third measurement, we will speak of extrinsic motivation and temporary behaviour change.

Measuring the effects of an ingroup vs. outgroup goal on behaviour means we can study whether this intrinsic form of social influence is enough to trigger an intrinsic motivation to perform—and sustain—sustainable energy behaviour, and whether this is more likely to be the case with an ingroup goal. Measuring the effects of an ingroup vs. outgroup surveillance on behaviour means we can study whether this extrinsic form of social influence will externalize the motivation for sustainable energy production, and thereby possibly undermine the intrinsically motivating effects of an ingroup goal.

Based on this reasoning, we expect that when people are asked to perform effortful pro-environmental behaviour on the rowing machine across the three trials, that H1: surveillance will increase effort investment when surveillance is present and decrease effort investment when surveillance is removed, signifying temporary behavioural change due to extrinsic motivation; H2: in the absence of surveillance, an ingroup goal will motivate a higher effort investment on the energy production task and in sustained behavioural change, while an outgroup goal will not; H3: when surveillance is introduced and then subsequently removed in the ingroup goal condition, some performance increase will be retained at the last measurement (after the removal of surveillance); while when surveillance is introduced and then removed in the outgroup goal condition, no performance increase will be retained at the last measurement. We conducted two studies to test these hypotheses that largely followed the same design.

Study 1

Method.

Participants were 114 psychology students, 31 from the Dutch and 83 from the English Bachelor program of a Dutch University (age $M = 20$, $SD = 1.80$, 61.4% female). They participated in the experiment in exchange for course credits. Written materials were presented in English. Verbal instructions were either Dutch or English, depending on the preference of the participant. Four test leaders were trained to execute the study procedure. Each participant was randomly assigned to one of four conditions of a 2 (no-surveillance x surveillance) x 2 (outgroup x ingroup) x 3 (T1, T2, T3) between-subjects design with repeated measures on the third factor.

The full test procedure is displayed in Table 4.1. Upon entering the lab, participants were asked for their informed consent. The test leader then presented the experimental setup, and gave the participant written instructions for the first energy production trial, without introducing the cover stories for the ingroup vs. outgroup and the surveillance manipulations yet. Participants read they were participating in a study on human energy production, and that the researchers were interested in how much energy a group of students could produce on a rowing machine. Participants further read that they would produce energy over three consecutive trials of five minutes each, with five-minute breaks in between. The three energy production trials were meant to be effortful in order to reflect costly sustainable energy behaviour. To rule out the possibility that a decrease in effort investment would be due to exhaustion, participants were instructed to perform to the best of their ability on each trial, but to make sure to complete all three trials without becoming completely exhausted before the end. After having read the instructions, the test leader explained the basic motions of rowing on a rowing machine, helped the participant get started on the first trial, and left the room.

The experimental manipulations were presented in the written instructions for T2, which the participant could read in the break while they were recovering from T1. The text for the ingroup-vs-outgroup manipulation read (manipulations printed in bold):

*Psychology students [the University Board] developed a plan on how the university can become fully self-reliant in its energy use in the next 10 years, and they ask all students to help achieve this goal. The first intervention they decided to implement is the concept of human-generated electricity. The **Psychology students [University Board]** plan [plans] to outfit all rowing, cycling, and running machines in the [student sports centre] with advanced dynamos and connect them to the electrical grid of the building. This way, all energy generated by students working out will directly power the building they are occupying.*

To manipulate surveillance, the following text was added:

*The equipment used in this study only records total group performance. For the **Psychology students [University Board]** to have an idea of how much energy individual students are able to produce, **the test leader will observe your personal performance on this trial.** During this trial, perform to the best of your ability, but make sure to complete the trial without becoming completely exhausted before you finish.*

In addition to reading this text, the test leader would enter the lab just in time for the start of T2, to check whether the participant had read the instructions and to observe and note their performance on T2. In the no-surveillance conditions, the instructions simply ended with the following text, and the participant continued the experiment privately:

During this trial, perform to the best of your ability, but make sure to complete the trial without becoming completely exhausted before you finish.

Next, all participants performed T3 privately, which allowed us to compare post-surveillance performance across experimental conditions. After the third trial, the participants filled out a questionnaire with questions on their affective state, motivation to perform the energy-production task, group efficacy, participative efficacy, individual efficacy beliefs, demographics, familiarity with rowing, and the extent to which the participant felt supported/pressured by the test leader to perform well. The experiment was concluded with a debriefing. Measures not relevant for this study are not described in this section but can be obtained upon request from the first author.

Table 4.1. Test procedure

Trial 1	Recovery	Trial 2	Recovery	Trial 3
Test leader instructs participant and leaves lab	Participant reads written manipulations (ingroup vs. outgroup goal; surveillance vs. no-surveillance)	Surveillance: test leader re-enters lab	No further manipulations	No test leader present
Energy production task T1		Energy production task T2		Energy production task T3
		Surveillance: test leader leaves lab		Questionnaire

Measures.

For the energy-production task, a Concept 2 Model E ergometer was used. Between the handle and the chain of the ergometer, a force sensor (Measurement Specialties, Inc.) was attached, which was connected to a data acquisition device (DAQ) (NI USB-6009). The DAQ device served to transfer the raw signals to a computer via USB, and these signals were collected in Volts (V) at a frequency of 100 Hz (Hartigh, Cox, & Gernigon, 2015). The data from the DAQ device allowed us to present real-time feedback on how much total energy production increased with each stroke during a trial. At all times, only the total energy produced was displayed to the participant, a starting number of around 500,000 Watt going up by 50 Watt with each stroke, depending on the individual strength of the participant. At the end of the study, the readings from the DAQ device were aggregated into individual performance scores for each trial. The energy production scores ranged from 1.45 to 5.88 Volts for T1 ($M = 3.31$, $SD = 1.02$), 1.06 to 5.87 Volts for T2 ($M = 3.47$, $SD = .97$), and 1.71 to 5.65 Volts for T3 ($M = 3.42$, $SD = .89$).

Results

To test how our manipulations of surveillance and group goal affected performance across time, we conducted a repeated-measures ANOVA (Huynh-Feldt corrected) with the manipulations of surveillance and group as between-

subject factors, time (T1, T2, T3) as a within-subjects factor, and performance on the energy production task as the dependent variable. Performance varied significantly over time: $F(1.66, 182.55) = 12.03, p < .001, \eta_p^2 = .099$. Also, the interaction effect of surveillance and time on performance was significant: $F(1.66, 182.55) = 9.92, p < .001, \eta_p^2 = .083$. The interaction effect of group and time, and the three-way interaction of surveillance, group and time on performance were not statistically significant (both F 's < 1.55 and both p 's $> .22$). These results suggest that the change in performance over time was primarily affected by surveillance.

As predicted, the simple effect of time was quadratic in the surveillance condition $F(1, 56) = 49.56, p < .001, \eta_p^2 = .469$: performance increased compared to baseline when surveillance was introduced at T2 and dropped to baseline levels when surveillance was removed at T3, regardless whether participants were performing for an ingroup or outgroup goal, supporting H1. In the no-surveillance condition, the simple effect of time was linear: $F(1, 54) = 6.30, p = .015, \eta_p^2 = .105$: performance increased over time compared to baseline levels in the absence of surveillance. This indicates that performance increases over time in the no-surveillance conditions, but it remains to be shown whether this is the case for both the ingroup and outgroup goal conditions, or just the ingroup goal condition.

Although the omnibus test did not show significant effects of ingroup vs. outgroup group goal on performance, we analysed whether there were linear simple effects of group goals on performance across the surveillance conditions in order to test H2 and H3. In the ingroup goal conditions, the linear simple effect of time was significant in the no-surveillance condition $F(1, 26) = 5.91, p = .022, \eta_p^2 = .185$, and approached significance in the surveillance condition $F(1, 27) = 3.65, p = .067, \eta_p^2 = .119$. In the outgroup goal conditions, the linear simple effect of time was not statistically significant in the no-surveillance condition, nor in the surveillance condition (both F 's < 1.27 and both p 's $> .27$). Even though the omnibus effect of ingroup vs. outgroup goal on performance was non-significant, the two linear simple effects (of ingroup and outgroup goal on performance) confirm H2: in the absence of surveillance, an ingroup goal

motivated a higher effort investment on the energy production task while an outgroup goal did not.

Interestingly, in the ingroup goal condition, the increase in performance in the no-surveillance condition occurred between T2 and T3 $F(1, 26) = 9.07, p = .006, \eta_p^2 = .259$, rather than between T1 and T2 $F(1, 26) = .96, p = .336, \eta_p^2 = .036$. This means that participants increased their efforts when presented with an ingroup goal, particularly in the no-surveillance condition, but this increase did not follow the manipulation immediately (Fig. 4.1), although there was a linear increase over time. No increase in performance was found in the outgroup goal, no-surveillance condition. These results imply that some caution is recommended before confirming H2 (in the absence of surveillance, an ingroup goal will motivate a higher effort investment on the energy production task while an outgroup goal will not) as we found that an ingroup goal increased effort investment in the absence of surveillance, but only when looking at the overall effect over time, not immediate after the manipulation.

Finally, we found no support for H3: when surveillance is introduced and then subsequently removed in the ingroup goal condition, some performance increase will be retained at the last measurement (after the removal of surveillance); while when surveillance is introduced and then removed in the outgroup goal condition, no performance increase will be retained at the last measurement, as the effects of both ingroup and outgroup goal on T3 performance were non-significant in the surveillance condition. However, there was a difference in T3 performance results in the surveillance condition between the ingroup and outgroup conditions, as the difference in mean performance between the T3 and T1 measurements approached significance in the ingroup goal surveillance condition $F(1, 27) = 3.65, p = .067, \eta_p^2 = .119$, while this was not the case in the outgroup goal surveillance condition $F(1, 29) = .09, p = .769, \eta_p^2 = .003$.

Figure 4.1. Results Study 1: the Y-axis shows the relative-to-baseline performance on the energy production task (including standard error bars)

Discussion.

We found in Study 1 that social influence in the form of surveillance by an ingroup or outgroup only temporarily increased contribution toward a group goal, as performance gains were lost as soon as surveillance was removed, which suggests that surveillance elicited an extrinsic motivation to improve the performance toward a group goal. Social influence in form of an ingroup goal increased the contribution toward a group goal on the last measurement in the no-surveillance condition, which is indicative of an intrinsic motivation. However, a significant increase in performance in the ingroup goal and no surveillance condition occurred only on the third measurement, instead of on the second measurement, which means that the increase in performance did not directly follow the ingroup goal manipulation. We currently have no explanation as to why this was the case.

Initially, we found no support for the hypothesis that when surveillance was introduced and then removed in the ingroup goal condition, some performance increase would be retained at the last measurement (after the removal of surveillance); while when surveillance was introduced and then removed in the outgroup goal condition, no performance increase would be retained at the last

measurement. The linear effect of time in the ingroup goal x surveillance condition did however approach significance, and future research is needed to examine whether the third hypothesis holds true.

The marginal linear increase in effort in the ingroup surveillance condition is interesting, as it suggests that the motivating power of ingroup goals is not necessarily undermined by surveillance, as suggested by H3. However, as this trend was marginally significant, the notion that the motivating effects of ingroup goals are resilient to extrinsic pressures such as surveillance awaits further proof. A possible explanation for both the marginally significant linear effect of ingroup goal in the surveillance condition, and the delayed positive effect of ingroup goal in the no-surveillance condition is that the distinction between ingroup and outgroup was not strong enough in this study. Psychology students and the University Board fall under the same superordinate ingroup: the University. We therefore conducted a follow-up study in which the distinction between ingroup (psychology students) and outgroup (oil company) was more pronounced.

Study 2

Method.

Participants were 135 psychology students, 30 from the Dutch and 105 from the English Bachelor program of a Dutch University (age $M = 20$, $SD = 2.15$, 63.7% female). They completed the experiment in exchange for course credits. Written materials were presented in English. Verbal instructions were either Dutch or English, depending on the preference of the participant. Two test leaders were trained to execute the study procedure. Each participant was randomly assigned to one of four conditions of a 2 (no-surveillance x surveillance) x 2 (outgroup x ingroup) x 3 (T1, T2, T3) between-subjects design with repeated measures on the third factor.

The procedure was identical to Study 1 apart from the (stronger) outgroup manipulation (which was the oil company). The text for the group manipulation read (manipulations printed in bold):

*Psychology students of the University of Groningen [the oil company] developed a plan to make the university fully self-sustaining in 10 years. They ask all students to help achieve this goal. The first intervention they want to implement is the concept of human-generated electricity. The **Psychology students [oil company]** plan [plans] to transform all cardio machines in the [student sports centre] into energy production devices, so that all energy generated by students working out will directly power the building they are occupying.*

To manipulate surveillance, the following text was added:

*The rowing machine keeps track of the total energy produced on it by all participants as a group. For the **Psychology students [oil company]** to know how much energy you are able to produce as an individual, a researcher from **the Psychology student team [oil company]** will observe and note your individual performance on this trial. During this trial, perform to the best of your ability, but make sure to complete all trials before you exhaust yourself.*

As in the surveillance conditions of Study 1, the test leader re-entered the lab before the start of T2, to check whether the participant had read the instructions and to observe and note their performance on T2. To strengthen the ingroup vs. outgroup manipulation, the test leader presented herself as a member of the psychology student initiative, or an employee of an oil company, further emphasized by a large logo of Psychology students (the Greek symbol psi) or an oil company (the red-and-yellow scallop shell) printed on the paper on which the individual performance score was noted. In the no-surveillance conditions, the instructions simply ended with the following text, and the participant continued the experiment privately:

The rowing machine keeps track of the total energy produced on it by all participants as a group. During this trial, perform to the best of your ability, but make sure to complete all trials before you exhaust yourself.

After the third trial, participants filled out a questionnaire including questions on motivation to perform the energy production task, the extent to which they felt supported/pressured by the test leader to do well, closeness with the test leader, warmth/competence perceptions of the two groups, identification with the two groups, demographics, and funnel questions. We also included an

attention check and a manipulation check to confirm our manipulations had the intended effects. The experiment was concluded with a debriefing. Measures not relevant for this study are not described in this section but can be obtained upon request from the first author.

Measures.

For the energy-production task, the same rowing machine but a newer DAQ device were used as in Study 1, the raw signals in Volts (V) were collected at a frequency of 250Hz. At all times, only the total energy produced was displayed to the participant, a starting number of around 20,000 Watt going up by 10 Watt with each stroke, depending on the individual strength of the participant. At the end of the study, the readings from the DAQ device were aggregated into individual performance scores for each trial. Because of the differences in sampling rate and data processing in the sensor used for this study, the data had to be transformed to match the output range of the DAQ device from the first study. Multiplying with 50 and subtracting 1 transformed the raw data into the energy production scores. The scores ranged from 1.36 to 6.26 Volts for T1 ($M = 3.23$, $SD = 1.02$), 1.51 to 6.30 Volts for T2 ($M = 3.40$, $SD = .96$), and 1.59 to 6.07 Volts for T3 ($M = 3.37$, $SD = .92$).

Manipulation check.

We asked two open-ended questions regarding the group manipulation: 'Who came up with the initiative to make the university more sustainable?', and 'Which group did the test leader represent?'. We coded any answer on the funnel questions as correct if respondents mentioned 'psychology students', or '(university) students' in the ingroup conditions, and 'oil company' in the outgroup condition. Some participants answered more generally with: 'university', but only when the subsequent answer on the second funnel question contained 'psychology students' in the ingroup condition, or 'oil company' in the outgroup condition, did we code their answer as correct.

Attention check.

Near the end of the first questionnaire following the energy-production task, we included a filler question in order to check whether the participants were

paying attention: 'Please answer 2 on this statement.' Failing to do so, the participants were excluded from the analysis.

Results.

Manipulation checks revealed that 17% of the participants ($n = 28$) could not recall the correct group condition they were in at the end of the experiment; we excluded them. In addition, an attention check in the questionnaire revealed two invalid scores, which were excluded as well. In total 135 valid participants were included in the analyses and that is the number of participants we report in this chapter as the total number of participants. Like Study 1, we conducted a repeated-measures ANOVA (Huynh-Feldt corrected) with the manipulations of surveillance and group as between-subject factors, time (T1, T2, T3) as a within-subjects factor, and performance on the energy production task as the dependent variable. Performance varied significantly over time: $F(1.57, 200.36) = 9.96, p < .001, \eta_p^2 = .072$. Also, the interaction effect of surveillance and time on performance was significant: $F(1.57, 200.36) = 9.09, p = .001, \eta_p^2 = .066$. The interaction effect of group and time, and the three-way interaction of surveillance, group and time on performance were not statistically significant (both F 's < 1.87 and both p 's $> .17$). These results show again that the change in performance over time was primarily affected by surveillance.

As predicted, the simple effect of time was quadratic in the surveillance condition $F(1, 65) = 54.73, p < .001, \eta_p^2 = .457$: regardless of whether participants were performing for an ingroup or an outgroup goal, surveillance increased performance when introduced at T2, but when removed at T3, the effort investment dropped to baseline levels of performance, supporting H1. In the no-surveillance condition, the simple effect of time was linear: $F(1, 63) = 8.35, p = .005, \eta_p^2 = .117$: performance gradually increased compared to baseline levels in the absence of surveillance.

Although the omnibus test did not show significant overall effects of ingroup vs. outgroup goal on performance across time, we again analysed whether there were linear simple effects of group goals on performance across the surveillance conditions to test H2 and H3. In the ingroup goal conditions, the linear simple effect of time was significant in the no-surveillance condition $F(1,$

30) = 7.34, $p = .011$, $\eta_p^2 = .197$, but not in the surveillance condition $F(1, 28) = 2.42$, $p = .131$, $\eta_p^2 = .080$. This outcome suggests that in the absence of surveillance, an ingroup goal leads to a sustained increase in performance on the energy production task. In the outgroup goal conditions, the linear simple effect of time was not statistically significant in the no-surveillance condition nor in the surveillance condition (both F 's < 1.71 and both p 's > .20). Instead the simple effect of time was quadratic in the outgroup goal, no-surveillance condition $F(1, 33) = 4.77$, $p = .036$, $\eta_p^2 = .126$: performance decreased compared to baseline levels when an outgroup goal was introduced at T2 and returned to baseline levels at T3. Even though the omnibus effect of ingroup vs. outgroup goal on performance was non-significant, the two linear simple effects (of ingroup and outgroup goal on performance) combined confirm H2: in the absence of surveillance, an ingroup goal motivated a higher effort investment on the energy production task while an outgroup goal did not. Furthermore, the outcome of the second analysis suggests that in the absence of surveillance, an outgroup goal is counter effective, leading to a temporary decrease in performance on the energy production task.

In contrast to Study 1, the increase in performance due to an ingroup goal in the no-surveillance condition occurred between T1 and T2 $F(1, 30) = 10.54$, $p = .003$, $\eta_p^2 = .260$, rather than between T2 and T3 $F(1, 30) = 2.08$, $p = .160$, $\eta_p^2 = .065$. In the outgroup goal condition, an increase in performance was found in the no-surveillance condition between T2 and T3 $F(1, 33) = 11.36$, $p = .002$, $\eta_p^2 = .256$, after an initial drop in performance at T2 (Fig. 4.2). These results suggest that participants increased (and sustained) their effort investment when presented with an ingroup goal in the no-surveillance condition—which means that H2 is supported.

Finally, we found no support for H3: when surveillance is introduced and then subsequently removed in the ingroup goal condition, some performance increase will be retained at the last measurement (after the removal of surveillance); while when surveillance is introduced and then removed in the outgroup goal condition, no performance increase will be retained at the last measurement, as the effects of both ingroup and outgroup goal on T3

performance were non-significant in the surveillance condition. Compared to the results of Study 1, the difference in T3 performance results in the surveillance condition between the ingroup and outgroup conditions were still visible (Fig. 4.2) but not significant, as the test for difference in mean performance between the T3 and T1 measurements in the ingroup goal surveillance condition yielded $F(1, 28) = 2.42, p = .131, \eta_p^2 = .080$, while it yielded $F(1, 37) = .005, p = .943, \eta_p^2 < .001$ in the outgroup goal surveillance condition.

Figure 4.2. Results Study 2: the Y-axes shows the relative-to-baseline performance on the energy production task (including standard error bars)

Discussion.

As in Study 1, we found in Study 2 that social influence in the form of surveillance only temporarily increased the contribution toward a group goal, as performance gains were lost as soon as surveillance was removed, which suggests that surveillance elicited an extrinsic motivation to improve the performance toward a group goal. Social influence in the form of an ingroup goal without surveillance increased the contribution toward a group goal which persisted to the last measurement, which is indicative of an intrinsic motivation. Unlike in Study 1, this increase in performance in the ingroup goal and no surveillance condition occurred on the second measurement, instead of on the third measurement, which means that the increase in performance directly followed

the ingroup goal manipulation, which gives us more confidence in the claim that the ingroup goal manipulation was directly responsible for the increase in performance on the energy production task.

We found no support for the hypothesis that when surveillance was introduced and then removed in the ingroup goal condition, some performance increase would be retained at the last measurement (after the removal of surveillance); while when surveillance was introduced and then removed in the outgroup goal condition, no performance increase would be retained at the last measurement. In order to explore whether a failure to replicate this finding was due to a lack of power, we pooled the samples of Study 1 and 2 into a single (mega) analysis of variance, while controlling for the effect of study as an additional factor in our design.

Results pooled analysis

To test how our manipulations of surveillance and group goal affected performance across time in the pooled analysis, we again conducted a repeated-measures ANOVA (Huynh-Feldt corrected) with the manipulations of surveillance and group as between-subject factors, time (T1, T2, T3) as a within-subjects factor, and performance on the energy production task as the dependent variable. Performance varied significantly over time: $F(1.58, 383.13) = 21.75, p < .001, \eta_p^2 = .082$. As before, the interaction effect of surveillance and time on performance was significant: $F(1.58, 383.13) = 18.81, p < .001, \eta_p^2 = .072$. And the interaction effect of group and time on performance was significant as well: $F(1.58, 383.13) = 3.22, p = .053, \eta_p^2 = .013$. The three-way interaction of surveillance, group and time on performance was not statistically significant $F(1.58, 383.13) = .99, p = .358, \eta_p^2 = .004$. These results suggest that the change in performance over time was affected both by surveillance and the manipulation of ingroup-vs-outgroup goal.

As predicted, the simple effect of time was quadratic in the surveillance condition $F(1, 123) = 106.29, p < .001, \eta_p^2 = .464$: performance increased compared to baseline when surveillance was introduced at T2 and dropped to baseline levels when surveillance was removed at T3, regardless whether participants were performing for an ingroup or outgroup goal, supporting H1. In

the no-surveillance condition, the simple effect of time was linear: $F(1, 119) = 14.80, p < .001, \eta_p^2 = .111$: performance increased over time compared to baseline levels in the absence of surveillance. This indicates that performance increases over time in the no-surveillance conditions, and we will examine further whether this is the case for both the ingroup and outgroup goal conditions, or just the ingroup goal condition.

The omnibus test showed a significant effect of ingroup-vs-outgroup group goal on performance, and we analysed further whether there were linear simple effects of group goals on performance across the surveillance conditions in order to test H2 and H3. In the ingroup goal conditions, the linear simple effect of time was both significant in the no-surveillance condition $F(1, 57) = 13.30, p = .001, \eta_p^2 = .189$, as well as in the surveillance condition $F(1, 56) = 6.09, p = .017, \eta_p^2 = .098$. In the outgroup goal conditions, the linear simple effect of time was not statistically significant in the no-surveillance condition, nor in the surveillance condition (both F 's < 3.02 and both p 's $> .09$). Together with the significant omnibus effect of ingroup-vs-outgroup goal on performance, the two linear simple effects (of significant ingroup and non-significant outgroup goal on performance) confirm H2: in the absence of surveillance, an ingroup goal motivated a higher effort investment on the energy production task while an outgroup goal did not.

Interestingly, in the ingroup goal condition, the increase in performance in the no-surveillance condition occurred between T1 and T2 $F(1, 57) = 8.43, p = .005, \eta_p^2 = .129$, and once more between T2 and T3 $F(1, 57) = 7.94, p = .007, \eta_p^2 = .122$. This means that participants increased their efforts when presented with an ingroup goal, particularly in the no-surveillance condition, and continued to increase their efforts further after the manipulation was removed (Fig. 4.3). No increase in performance was found between T1 and T2 in the outgroup goal, no-surveillance condition $F(1, 62) = .095, p = .759, \eta_p^2 = .002$, but there was an increase in performance between T2 and T3 in the outgroup goal, no-surveillance condition $F(1, 62) = 12.61, p = .001, \eta_p^2 = .169$.

These results confirm H2 (in the absence of surveillance, an ingroup goal will motivate a higher effort investment on the energy production task while an

outgroup goal will not) as we found that an ingroup goal increased effort investment in the absence of surveillance both between T1 and T2, and between T2 and T3. Even though we found an increase in performance between T2 and T3 in the outgroup goal no-surveillance condition, the overall increase on T3 was non-significant compared to baseline (T1) $F(1, 62) = 3.02, p = .087, \eta_p^2 = .046$, as performance first decreased when the outgroup goal was introduced on T2, and returned to baseline levels on T3, as can be seen in Figure 4.3.

Finally, we found support for H3: when surveillance is introduced and then subsequently removed in the ingroup goal condition, some performance increase will be retained at the last measurement (after the removal of surveillance); while when surveillance is introduced and then removed in the outgroup goal condition, no performance increase will be retained at the last measurement. We found that there was a significant difference in T3 performance results in the surveillance condition between the ingroup and outgroup conditions, as the difference in mean performance between the T3 and T1 measurements was significant in the ingroup goal surveillance condition $F(1, 56) = 6.09, p = .017, \eta_p^2 = .098$, while this was not the case in the outgroup goal surveillance condition $F(1, 67) = .06, p = .813, \eta_p^2 = .001$. This means that when participants were performing toward an ingroup goal, some performance gain was retained after the removal of surveillance, while this was not the case for participants who were performing for an outgroup goal (see Fig. 4.3).

Figure 4.3. Results Pooled Study: the Y-axes shows the relative-to-baseline performance on the energy production task (including standard error bars)

General Discussion

It is often assumed that individuals need to be extrinsically motivated to contribute to group goals that do not directly serve their individual interest (i.e. group goals that come at a personal cost). Yet, extrinsically motivated behaviour is contingent on rewards or social reinforcements, which are costly to maintain. Furthermore, interventions targeting extrinsic motivation can undermine intrinsic motivation to act sustainably if they produce extrinsically motivated behaviour, thereby inhibiting volitional contributions toward a group goal. Our research explored whether there is a way to encourage pro-environmental behaviour without undermining the intrinsic motivation to do so.

Over the course of two studies and a pooled analysis, we found that surveillance only temporarily increased contribution toward a group goal, as performance gains were lost as soon as surveillance was removed, which suggests that surveillance elicited extrinsic motivation to perform better (confirming H1). We further found that providing people with an ingroup goal resulted in a sustained increase in pro-environmental behaviour: personal contributions towards a group goal steadily increased in the ingroup goal condition, but not in the outgroup goal condition (confirming H2).

It's important to note that we found support for H2 by testing individual simple effects of ingroup and outgroup goal on performance over time separately, as the omnibus main effect of group goal on performance was not significant in the two studies. The omnibus main effect did show a trend in the right direction (the ingroup goal leading to a steeper increase in performance than an outgroup goal—in the no-surveillance condition). The fact that the omnibus main effect of group goal on performance was significant in the pooled analysis suggests that that a lack of power might explain why we did not find it in the two studies.

Another interesting finding of the pooled analysis is that when surveillance was introduced and then removed in the ingroup goal condition, some performance was retained at the last measurement (after the removal of surveillance); while when surveillance was introduced and removed in the outgroup goal condition, no performance increase was retained at the last measurement. We interpret this result such that when the extrinsic effect of surveillance and the intrinsic effect of an ingroup goal are combined, they independently affect participant's performance on the task such that the performance increase due to surveillance is lost once surveillance is removed, but the performance increase due to an ingroup goal is retained on the last measurement (after surveillance was removed), confirming H3.

It must however be said that the resulting gain in performance toward an ingroup goal after the removal of surveillance was still much lower than the gain in performance toward an ingroup goal in the no-surveillance condition. The pooled analysis even showed that an ingroup goal without surveillance can inspire a continued effort increase over time, even when the ingroup goal is no longer mentioned (on T3). This means that an ingroup goal (compared to surveillance) is a preferred means of social influence for achieving increased and sustained behavioural change.

The results of the pooled analysis suggest that the intrinsically motivating effect of an ingroup goal need not be undermined using surveillance and its subsequent removal. Which suggests an ingroup context can prevent or “buffer against” the backlash of extrinsic influence strategies such as surveillance when these are removed. However, this conclusion should be drawn with caution as we

only found support for H3 in the pooled analysis, and future research is needed to test whether these findings can be replicated. Also, the question remains whether similar effects would be found for other types of extrinsic motivator such as financial incentives or competitions.

To summarize, our research addressed a key “surveillance dilemma”, namely that surveillance motivates sustainable behaviour among those less concerned with group goals, albeit in the short term, but can also backfire in the longer term when removed, if it alienates those who are willing to contribute to a group goal of their own volition. Surveillance remains an effective policy instrument for those that are less concerned with the group and thus less motivated to rally to its cause, but it is not a sustainable solution by itself, as it needs to be constantly maintained to remain effective. Our findings suggest that when pro-environmental goals are set in an ingroup context, they motivate a sustained increase in performance toward a group goal, potentially not only without surveillance, but also when surveillance is present and then removed, as indicated in our pooled analysis. This suggests that ingroup goals provide a robust source of motivation to engage in pro-environmental behaviour.

Acknowledgements

We would like to thank dr. M. M. Span for his work on programming the energy-production task, and J. C. Hohmann for her help with the data collection of Study 2.

Chapter 5

General Discussion

In this dissertation, I set out to study how an intrinsic motivation toward sustainable energy use could be promoted within the context of the energy transition from fossil fuels to renewables, and subsequent energy savings. A novel approach to promote sustainable energy behaviour are local energy initiatives, in which people combine efforts to invest in local renewable energy production, use sustainable energy technologies, and reduce fossil energy use (Seyfang & Haxeltine, 2012). Such groups are often key sources of social influence to motivate sustainable energy behaviour in the communities in which they are established and are a key theme of our research.

We argued that social influence has typically been understood as extrinsically motivating (Cialdini & Trost, 1998; Deutsch & Gerard, 1955; Ryan & Deci, 2000a), which can be detrimental to intrinsic motivation. This is an important issue as behaviour change that is intrinsically motivated is more likely to sustain itself across time and context. We studied whether and when social influence can foster intrinsic motivation and thereby elicit lasting behavioural change.

The traditional understanding of social influence is that people act out what the group wants in order to gain social acceptance or to avoid social sanctions (Cialdini & Trost, 1998). This extrinsic view of social influence, a process referred to as “normative influence”, is rooted in the dual-process theory of the group

(Deutsch & Gerard, 1955), which regards groups as external to the self. The group-extrinsic-to-self approach implies that participating in a local energy initiative would strengthen extrinsically motivated engagement in sustainable energy behaviour, driven by the desire to avoid social sanctions or reap social benefits, rather than in intrinsic motivation to reduce fossil energy use out of a personal sense of importance to do so.

We argued that social influence does not always elicit an extrinsic motivation to reduce fossil energy use in the context of a local energy initiative. We based our assumption on another theoretical perspective on social influence in the social psychology literature. Notably, according to Turner's self-categorization theory (Turner, 1982; 1987; 1991), the group can be experienced as an extension of the self (or indeed, one form of it), particularly when people identify strongly with the group. We reasoned that this implies that social influence, particularly among those who strongly identify with the group, could intrinsically motivate people to act in line with the group goals.

Our understanding of intrinsic motivation is that it is experienced when one acts upon valued principles in one's life, such as biospheric values, or group goals—for those that strongly identify with the group. Indeed, research has shown that acting on what is important to the self is self-rewarding, and therefore intrinsically motivating (Bolderdijk et al., 2013; Taufik, Bolderdijk, & Steg, 2015; Venhoeven, Bolderdijk, & Steg, 2013, 2016). Our understanding of intrinsic motivations differs from the view proposed by Ryan and Deci (2000b), who state that behaviour is intrinsically motivating when it is performed for its own sake—and not as a means toward an end, such as fulfilling a personal value. We argued that this is a too narrow definition of the term 'intrinsic', as it defines the motivation as intrinsic to the *object* of fascination (such as in play), rather than intrinsic to the *subject* interacting with the object (i.e. the self). We therefore proposed that intrinsic motivation can be experienced when a person acts in a way to fulfil a principle, value or goal, in line with Lindenberg's (2001a) notion of obligation-based intrinsic motivation. This suggests that intrinsic motivation can be rooted in biospheric values, as well as group goals for those that strongly identify with the group.

Hence, if the question is concerned whether intrinsic motivation can arise from social influence, we argued, based on self-categorization theory that: yes, it can, particularly when the individual strongly identifies with the group. What follows from this approach is that people who strongly identify with the group, such as a local energy initiative, could internalize the sense of importance of the group to use energy more sustainably in the self, which could result in a personal and intrinsically motivated goal for sustainable energy use. This means that group identification is likely to moderate whether the importance of sustainable energy behaviour conveyed by the group results in more intrinsically or extrinsically motivated sustainable energy behaviour.

Our reasoning provides a theoretical contribution to the understanding of intrinsic motivation and how it may emerge from the group. This is important, because the current assumption is that intrinsic motivation is an evolved propensity of the individual, and that the group is extrinsic to the self. As we have reasoned how intrinsic motivation could arise from an ingroup context, we then asked: how would different operationalizations of social influence affect intrinsic motivation, and are there specific criteria to meet for social influence to be most likely to foster intrinsic motivation?

We expected that the likelihood that social influence would enhance, or secure intrinsic motivation would depend on the *type* of social influence exerted by the group. Specifically, we proposed that intrinsic motivation to perform pro-environmental behaviour in an ingroup would be highest when the form of social influences scored positively on the following three dimensions: 1) the importance the group assigned to the issue of sustainable energy behaviour is clearly conveyed, 2) minimal group pressure is involved, and 3) issue importance is formulated at the level of specificity of the behaviour.

The first criterion for social influence to foster intrinsic motivation we proposed is that social influence needs to make explicit that the group values a goal, such as the importance of using energy sustainably. That is why we refer to this criterion as ‘issue importance’. The second criterion for fostering intrinsic motivation is that the individual group members feel they are choosing to adopt the issue importance out of their own volition—rather than feeling pressured to

do so by the group, which would be an extrinsic motivation. That is why we refer to this criterion as ‘minimal group pressure’. The third criterion for fostering intrinsic motivation is that the group goals that are being conveyed by social influence will most easily translate into behaviour if they are formulated at the same level of specificity as the desired outcome behaviour. That is why we refer to this criterion as ‘behavioural specificity’. Based on this reasoning, we proposed that social influence variables that fulfil these criteria would be more likely to foster intrinsically motivated behaviour.

What have we learned?

In this dissertation we investigated whether different types of social influence can have a positive effect on intrinsic motivation (particularly when one strongly identifies with a group), whether intrinsic motivation can mediate the effect of social influence on behaviour, and whether behaviour affected by social influence sustains itself across time. We proposed that when social influence meets the three criteria of issue importance, minimal group pressure, and behavioural specificity, and when the individual identifies with the group from which the social influence occurs, the likelihood will increase that social influence will have a positive effect on intrinsic motivation, for its effects on behaviour to be mediated by intrinsic motivation, and for that behavioural change to last into the future.

Can social influence have a positive effect on intrinsic motivation?

We found across our studies that different forms of social influence we operationalized were able to positively affect intrinsic motivation, such as injunctive norms and group importance. This was contrary to our expectation that some forms of social influence would be most likely to positively affect intrinsic motivation, particularly group importance. For example, injunctive norms—that scored positively on two of our three criteria, and which we only measured in Chapter 3—had a positive main effect on intrinsic motivation, and an equally strong indirect effect on behavioural intentions as group importance. Group importance—that scored positive on all three of our criteria—had a

positive main effect on intrinsic motivation in Chapter 2, and a positive effect on intrinsic motivation for high-identifiers (the interaction effect we proposed) in Chapter 3.

The fact that that group importance and group identification had a positive interaction effect on intrinsic motivation in Chapter 3⁴, while this was not the case in Chapter 2, can also be attributed to the type of group one identified with in Chapter 2 (the neighbourhood) and in Chapter 3 (the local energy initiative). We noted earlier that the studies in both Chapters 2 and 3 took place in social groups participants could identify with (i.e. ingroups), but that the group in Chapter 3 was a more selective and homogenous ingroup of the two⁵, containing only the people who were interested in being part of the local energy initiative.

Therefore, the way in which social influence can positively affect intrinsic motivation—as either a main effect or an interaction with group identification—appears to depend on both the type of social influence (i.e. the three criteria) as well as the type of ingroup context (i.e. the local energy initiative vs. the neighbourhood). The reason we found an interaction effect of group importance and group identification in Chapter 3 (and not in Chapter 2) may be due to the fact that group importance was measured in a more favourable ingroup context (i.e. the local energy initiative). However, future research is required to take apart this finding further and investigate to what extent the characteristics of social influence, or the group, contribute to a positive effect of social influence on intrinsic motivation.

Can intrinsic motivation mediate the effect of social influence on behaviour?

We found across our studies that intrinsic motivation can indeed mediate the effect of social influence on behaviour, but particularly for some types of social influence, notably, injunctive norms and group importance. We found in

⁴ And descriptive norms and group identification as well, although this interaction effect was marginally significant.

⁵ We observed the mean group identification to be higher in the local energy initiative in Chapter 3 ($M = 4.00$, $SD = 1.05$), compared to the mean group identification in Chapter 2 ($M = 3.19$, $SD = 1.10$).

Chapter 2 that the effect of group importance on participation was mediated by intrinsic motivation, although this mediation occurred irrespectively of the extent the participant identified with the group (i.e. the neighbourhood). We found in Chapter 3 that the effects of both injunctive norms and group importance on behavioural intentions to reduce energy use were mediated by intrinsic motivation, particularly for those participants that strongly identified with the group (i.e. the local energy initiative), as we had expected.

The finding that (in both Chapters 2 and 3) intrinsic motivation mediated the effect of group importance on behaviour while it did not mediate the effect of descriptive norms on behaviour indicates that it is the type of social influence that determines whether social influence can have an indirect effect on behaviour (via intrinsic motivation). The finding that the mediation effect of group importance was moderated by group identification in Chapter 3 but not in Chapter 2 indicates that it is the type of group (i.e. ingroup context) that determines the type of the indirect effect of social influence on behaviour. In other words, the fact that the ingroup from Chapter 3 (the local energy initiative) facilitated group identification to moderate the mediation effect of social influence on behaviour while the ingroup from Chapter 2 (the neighbourhood) did not, suggests that some types of ingroups are conducive to finding mediations of social influence on behaviour to be moderated by group identification. Specifically, we expect that the group (local energy initiative) in Chapter 3 was more tightly knit and conducive to mediating the effects of social influence to behaviour than a broader sort of group such as the neighbourhood from Chapter 2.

Finally, we found in the mediation models that not only the effect of group importance was moderated by group identification in Chapter 3, but also the effect of injunctive norms. We also showed in Chapter 3 that there was no significant difference between these two indirect effects, meaning that group importance had no stronger indirect effect on behaviour than injunctive norms. This means that in the local energy initiative, both injunctive norms and group importance indirectly affected behaviour through intrinsic motivation, particularly for those members who strongly identified with the group.

Based on our theorizing (injunctive norms implying more group pressure than group importance), we expected to find a difference between the effects of group importance and injunctive norms on intrinsic motivation and behavioural intentions (the difference being in favour of group importance having a stronger positive effect). However, the positive effect of injunctive norm on intrinsic motivation may not be so surprising for high identifiers as they are arguably less likely to experience this norm as group pressure (because for high identifiers, the group norm can be experienced as coming from within oneself). Alternatively, the finding that both group importance and injunctive norms were positively related to intrinsic motivation may be due to our operationalization of injunctive norm, which was in some respect similar to the operationalization of group importance, stressing the *importance* of energy saving. Specifically, we conceptualised group importance as: 'AmersVolt members think *it is* important to use as little (fossil) energy as possible'. While we conceptualized injunctive norm as: 'AmersVolt members think it is important that *I* use as little (fossil) energy as possible' (emphasis added), which is different from group importance by focussing on what people think others expect them to do. This may have been too subtle difference in operationalization between group importance and injunctive norm. Future research could use alternative conceptualisations of injunctive norms, stressing whether people expect social approval or disapproval, if it were formulated like: 'AmersVolt members would approve if I used as little (fossil) energy as possible', or 'AmersVolt members would disapprove if I used a lot of fossil energy'. Future research could opt for another conceptualisation of injunctive norm, to examine the conditions under which injunctive norms can (or cannot) foster intrinsic motivation, and whether this in turn promotes intention to use less energy.

Summarizing, we did find some evidence that intrinsic motivation mediates the effect of social influence on behaviour. Yet, we found this to be the case for some forms of social influence and not for others, most notably for injunctive norms and group importance and not for descriptive norms. We also found some support for our reasoning that intrinsic motivation would mediate the effect of social influence more strongly for people that strongly identified with the group,

particularly when social influence was conveyed in the form of group importance and injunctive norms, and particularly when the group was organized around the issue of the outcome behaviour, such as the local energy initiative.

Can social influenced behaviour sustain itself across time?

We found across two studies in Chapter 4 that behaviour affected by social influence can indeed sustain itself across time, but that both the type of social influence as well as the presence of an ingroup context are important in determining whether a long term effect on behaviour occurs. Specifically, we found participants to increase and sustain their increased performance on the energy production task when they were performing the task for an ingroup goal without surveillance. As we did not find this increase in performance for an outgroup goal without surveillance, we conclude that it is not only social influence resulting from a group goal that is responsible for a sustained increase in behaviour, but that for a group goal to intrinsically motivate a sustained behavioural change, the group goal needs to emerge from the ingroup context.

We further found in both studies of Chapter 4 that social influence in the form of surveillance only temporarily increased performance on the energy production task, and that the increase in behaviour diminished after surveillance was removed, in both the ingroup and outgroup conditions. This pattern of loss of performance after the removal of surveillance is typical of an extrinsic motivation, as the increase in behaviour seems contingent on the presence of an extrinsic stimulus (i.e. surveillance). At first glance, this shows that when social influence is presented as surveillance, it has an extrinsically motivating effect.

However, this loss of performance was not equally great in the ingroup setting, compared to the outgroup setting. Specifically, we found in the pooled analysis of Chapter 4 that when surveillance was introduced and then removed in the ingroup goal condition, some performance was retained at the last measurement (after the removal of surveillance), while when surveillance was introduced and removed in the outgroup goal condition, no performance increase was retained at the last measurement. This finding suggests that surveillance (and this could apply for social influence in general) is not *de facto* extrinsically motivating, as the extent of extrinsic (de)motivation seems to

depend on the social context. In an ingroup goal context, surveillance is less damaging to a sustained behaviour change than in an outgroup goal context, just as a group *goal* is more motivating in the form of an ingroup goal (ingroup context) than in the form of an outgroup goal (outgroup context).

We remind the reader that the field studies performed in Chapters 2 and 3, which found positive relationships between social influence and intrinsic motivation and behaviour, were all performed in an ingroup context (the neighbourhood in Chapter 2, and the local energy initiative in Chapter 3). One must therefore interpret the positive effects of social influence on intrinsic motivation and behaviour as those occurring within an *ingroup*, and one must be careful about generalizing the positive effects of social influence on behaviour outside an ingroup context.

Limitations and suggestions for future research

The main limitation of the field studies in Chapter 2 and 3 was that all the positive effects of social influence on intrinsic motivation and sustainable behaviour we found occurred in an ingroup context. This means that one should take care in generalizing the insights that social influence can affect intrinsic motivation and lead to lasting behavioural change outside an ingroup. Although we theorized in Chapters 2 and 3 that group identification would moderate whether social influence could have a positive effect on intrinsic motivation (but we failed to find consistent proof for this), based on the results from Chapter 4, it seems that the ingroup context was a bigger determinant of why even more extrinsically oriented social influence variables, such as injunctive norms, had positive effects on intrinsic motivation. Group identification (with an ingroup) may therefore be less important in determining whether social influence (from that ingroup) has a positive effect on intrinsic motivation, but rather the fact that social influence *comes* from an ingroup (instead of an outgroup) is a more important determinant of social influence positively affecting intrinsic motivation.

Put differently, the field studies did not have a control group in which the participants were exposed to social influence effects from an outgroup. That is our

main recommendation for following up on the studies from Chapters 2 and 3 in future research.

The other limitation inherent to the field studies in Chapter 2 and 3 was that the insights we found in the data were correlational in nature. We tried to amend this as best as possible by separating the measurements in time in Chapter 3, so that we could at least argue that the independent variables preceded the dependant variables in time, but true causality would still be better derived from an experiment. Separating the measurement of independent and dependent variables over time in Chapter 3 also addressed one of the main concerns on potential bias caused by common method variance raised in Chapter 2. However, a control group (in the form of an outgroup) could still have addressed many concerns about causation, as it would have allowed us to test the hypothesis that the social influence variables have different effects in an ingroup vs. outgroup context. Still, to investigate the difference between the social influence variables themselves, an experimental setting is preferred. This is an important issue that can be addressed in future research.

What we would like to see done in future research is a field study with more experimental differentiation of the ingroup and outgroup context. This could be done by conducting the field study among residents in a homogenous neighbourhood and using a random sample of citizens from the rest of the city as a weaker form of ingroup on which to test the effects of social influence on intrinsic motivation and behaviour. The objective here would be to contrast the effects of social influence variables from a stronger ingroup with the effects of social influence variables from a weaker ingroup.

Another (and perhaps even stronger) way of performing a field experiment would be to take an initiative or neighbourhood as the ingroup and split it into two samples and to present one sample with social influence variables from that ingroup, and present the other sample with social influence variables from a different neighbourhood or maybe even a corporation (i.e. the outgroup). The objective here would be to contrast the effects of ingroup social influence versus outgroup social influence.

Given that we did not manage to discriminate sufficiently between the independent variables of injunctive norm and group importance in Chapter 3, another addition to the line of research mentioned above would be to develop improved operationalizations of social influence variables so that our findings can be cross-validated with other conceptualizations of social influence, ranging from most extrinsic to most intrinsic forms of social influence and test their effects on intrinsic motivation and behaviour—in combination with an ingroup vs. outgroup context.

Also, the final sample size in Chapter 3 was small because not all participants participated in all questionnaire waves. The small sample size means that we had a conservative test of our hypotheses. Yet, we still found the predicted interaction effects of group importance and injunctive norms on intrinsic motivation. Future research is required to see whether these results can be replicated with larger, better powered, samples.

We would also like to note that although the field study chapters used single item self-report measures, which can be seen as a potential psychometric issue because the reliability of single item scales is both unknown and unknowable, we are not that worried about this issue as literature has shown that single item scales can correlate highly with their multi-item counterparts (Wanous, Reichers, & Hudy, 1997; Atroszko, Bagińska, Mokosińska, Sawicki, & Atroszko, 2015). Also, although the dependent variable of Chapter 3 was based on a self-report measure of the intention to reduce one's energy use, the dependent variables of Chapter 2 (whether the participant was a member of a local energy initiative or a non-member resident of the same neighbourhood) and Chapter 4 (energy produced on a rowing machine ergometer) were measures of real behaviour. Therefore, the overall conclusions we derive from the dependent variables of this dissertation are primarily based on measures of real behaviour and are complemented by self-report measures of behavioural perceptions and intentions. Finally, although we found no significant effects of descriptive norms on intrinsic motivation in Chapters 2 and 3, we cannot rule out the fact that a positive relationship between descriptive norms and intrinsic motivation can exist in principle. These are the inherent shortcomings of null-hypothesis tests

(Harms & Lakens, 2018). Although the null-hypothesis can never be disproven through statistical sampling methods, Harms & Lakens (2018) provide alternative hypothesis testing methods to consider in future research.

Chapter 4 addressed the shortcomings of the correlational field studies by an experimental design, as we experimentally separated the ingroup from the outgroup context, and a more intrinsic form of social influence (group goals) from a more extrinsic one (surveillance). Yet, we did not find the hypothesized interaction effect of ingroup surveillance and ingroup goals, such as that performance after the removal of surveillance in an ingroup context would be higher than performance after the removal of surveillance in an outgroup context, in the two individual studies. Only when we pooled the samples of the two studies in Chapter 4, however, did we find this effect to be significant. Given the precariousness of this finding, replicating this finding in future research is required to bolster our interpretation that even the effects of extrinsic forms of social influence on intrinsic motivation can be ameliorated by an ingroup context.

Conclusion

In this dissertation, I set out to study whether social influence could positively affect an intrinsic motivation for those who strongly identify with the group, whether the effects of social influence on behaviour would be mediated by intrinsic motivation, and whether behaviour affected by social influence that fostered intrinsic motivation could persist over time without additional social reinforcement.

We found that group identification was a less important determinant of social influence positively affecting intrinsic motivation and behaviour than we thought—as we found inconsistent evidence of group identification moderating the effect of different types of social influence on intrinsic motivation across Chapters 2 and 3. Rather, we found on a number of occasions that group identification had a direct effect on intrinsic motivation, probably due to the fact that identifying with—and living in—a sustainable neighbourhood or a local energy initiative meant that one was already somewhat intrinsically motivated to engage in sustainable energy behaviour.

We also found that the *type* of social influence was a less important determinant of social influence positively affecting intrinsic motivation and behaviour than we thought—as we found in Chapter 3 that even the more extrinsic forms of social influence positively affected intrinsic motivation. We note that the more intrinsic forms of social influence (such as group importance) did have stronger positive relationships with intrinsic motivation the more one identified with the ingroup—but we only found this for the members of the local energy initiative (Chapter 3), and not for the neighbourhood residents in general (Chapter 2).

The finding that multiple forms of social influence can have a positive effect on intrinsic motivation may be confounded by the fact that all our field studies occurred in an ingroup setting (the neighbourhood and the local energy initiative). The experimental studies in Chapter 4 showed that the (in)group context affected the likelihood of social influence having a positive effect on intrinsic motivation and behaviour as intrinsic forms of social influence (group goals) positively affected intrinsic motivation and behaviour only in an ingroup setting. While even extrinsic forms of social influence (such as surveillance) undermined long term behavioural change *less* in an ingroup setting than in an outgroup setting.

We therefore conclude that whether or not social influence positively affects an intrinsic motivation and produces a lasting behavioural change primarily depends on the social context in which the social influence occurs (ingroup vs. outgroup), and that more intrinsic forms of social influence (group importance and group goals) have stronger effects on intrinsic motivation and a lasting behavioural change, particularly for those who strongly identify with the ingroup.

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Nederlandse samenvatting

Dutch summary

In dit proefschrift hebben we onderzocht hoe de energietransitie van fossiele brandstoffen naar hernieuwbare energiebronnen kan worden bevorderd door sociale beïnvloeding binnen groepsinitiatieven. Wij denken dat intrinsieke motivatie belangrijk is om blijvend duurzaam energiegedrag te stimuleren en hebben onderzocht of intrinsieke motivatie versterkt kan worden door sociale beïnvloeding binnen groepen.

Een nieuwe benadering om duurzaam energiegedrag te bevorderen zijn lokale energie-initiatieven, waarin mensen hun krachten bundelen om te investeren in lokale hernieuwbare energieproductie, om duurzame energietechnologie te gebruiken en om te streven naar een vermindering van de fossiele energieconsumptie (Seyfang & Haxeltine, 2012). Dergelijke groepen zijn vaak belangrijke bronnen van sociale beïnvloeding om duurzaam energiegedrag in gemeenschappen te stimuleren en zijn daarom een belangrijke thema van ons onderzoek.

In de literatuur wordt sociale beïnvloeding doorgaans als extrinsiek motiverend opgevat (Cialdini & Trost, 1998; Deutsch & Gerard, 1955; Ryan & Deci, 2000a), waardoor het intrinsiek gemotiveerd gedrag kan ondermijnen. Intrinsieke motivatie is juist belangrijk voor blijvende gedragsverandering omdat het een drijfveer is die zichzelf standhoudt over tijd en door verschillende situaties heen. Daarom kan sociale beïnvloeding een belangrijk risico zijn voor

lokale energie-initiatieven, omdat het een intrinsieke motivatie om duurzaam energiegedrag te vertonen kan ondermijnen.

Het traditionele begrip van sociale beïnvloeding is dat mensen alleen in het belang van een groep handelen om sociale goedkeuring te verkrijgen, of om sociale sancties te vermijden (Cialdini & Trost, 1998). Deze extrinsieke visie op sociale beïnvloeding, een proces dat normatieve beïnvloeding wordt genoemd, is geworteld in de *dual-process* theorie van de groep (Deutsch & Gerard, 1955). Deze benadering beschouwt de groep als extrinsiek aan het zelf. Het gevolg van deze redenering is dat wanneer een lokaal energie-initiatief duurzaam energiegedrag wil stimuleren, dit de extrinsieke motivatie om bij te dragen aan de energietransitie zal versterken—gedreven door de wens om sociale sancties te vermijden of sociale goedkeuring te verkrijgen—in plaats van dat het tot een intrinsiek gemotiveerde betrokkenheid leidt om fossiele energieconsumptie te verminderen, zoals vanuit een gevoel van een persoonlijk belang om dit te doen.

Wij beargumenteren in dit proefschrift dat sociale beïnvloeding in een lokaal energie-initiatief niet altijd tot een extrinsieke motivatie voor gedragsverandering hoeft te leiden. Wij baseren onze hypothese dat sociale beïnvloeding ook intrinsiek gemotiveerd gedrag kan versterken op een ander theoretisch perspectief op sociale beïnvloeding vanuit de sociale psychologieliteratuur. Namelijk, volgens de zelf-categorisatie theorie (Turner, 1982; 1987; 1991) kan een groep worden ervaren als een verlengstuk van het zelf (of zelfs één vorm van het zelf), vooral wanneer mensen zich sterk identificeren met een groep.

Wij redeneerden dat dit implicaties heeft voor de manier waarop sociale beïnvloeding effect heeft op motivatie en gedrag, vooral onder diegenen die zich sterk identificeren met een groep. Dit betekent namelijk dat sociale beïnvloeding mensen ook intrinsiek kan motiveren om te handelen in overeenstemming met de doelen van de groep (zoals een lokaal energie-initiatief), vooral als de groep wordt beleefd als een onderdeel van het zelf. Wij hebben daarom onderzocht in welke mate en onder welke condities sociale beïnvloeding de intrinsieke motivatie kan versterken om consistent duurzaam energiegedrag te vertonen.

Wij stellen dat intrinsieke motivatie niet alleen sterker is wanneer iemand handelt naar belangrijke principes in zijn of haar leven, zoals biosferische waarden (belang van natuur en milieubescherming), maar ook wanneer iemand handelt in overeenstemming met belangrijke doelen van de groep (zoals duurzaam omgaan met energie in het geval van een lokaal energie-initiatief), vooral als men zich sterk identificeert met die groep. Onderzoek heeft namelijk aangetoond dat handelen naar wat belangrijk is voor het zelf een goed gevoel oplevert, en dus zichzelf beloont en daarom intrinsiek motiverend is (Bolderdijk et al., 2013; Taufik, Bolderdijk, & Steg, 2015; Venhoeven, Bolderdijk, & Steg, 2013, 2016).

Ons begrip van intrinsieke motivatie wijkt af van de opvatting van Ryan en Deci (2000b), die stellen dat gedrag intrinsiek motiverend is wanneer het wordt uitgevoerd omwille van het gedrag zelf—en niet als een middel om een doel te bereiken, zoals het vervullen van een persoonlijke waarde. Wij betogen in dit proefschrift dat dit een te enge definitie is van de term 'intrinsiek', omdat Ryan en Deci (2000b) motivatie beschouwen als intrinsiek voor het *object* van fascinatie (zoals een spel), in plaats van intrinsiek voor het *subject* dat de interactie aangaat met het object (d.w.z. het zelf). Wij stellen daarom voor dat intrinsieke motivatie ook kan worden ervaren wanneer een persoon handelt om een principe, waarde of een doel te bereiken. Deze opvatting is tevens in overeenstemming met de notie van Lindenberg (2001a) van, op verplichting gebaseerde, intrinsieke motivatie. Dit suggereert dat intrinsieke motivatie kan voortkomen uit biosferische waarden, alsook uit groepsdoelen voor diegenen die zich sterk identificeren met een groep.

Daarom betogen wij op basis van de zelfcategorisatietheorie, voor zover het de vraag betreft óf intrinsieke motivatie kan voortkomen uit sociale beïnvloeding: dat het kan, vooral wanneer het individu zich sterk identificeert met de groep. Wat hieruit volgt is dat mensen die zich sterk identificeren met een lokaal energie-initiatief, het groepsbelang om duurzamer met energie om te gaan zouden kunnen internaliseren en ervaren als een eigenbelang—wat weer kan leiden tot een intrinsiek gemotiveerd *persoonlijk* doel voor duurzaam energiegebruik. Wij redeneren dus dat de mate waarin sociale beïnvloeding tot

intrinsiek of extrinsiek gemotiveerd gedrag zou leiden bepaald wordt door de mate waarin iemand zich identificeert met de groep.

Deze redentatie kan een nieuwe theoretische bijdrage leveren aan het begrip van intrinsieke motivatie en hoe deze uit een groep kan voortkomen. Dit is een relevante bijdrage omdat de huidige veronderstelling is dat intrinsieke motivatie voortkomt uit het beoefenen van gedrag omwille van het gedrag zelf, of omwille van het realiseren van persoonlijk doel van een individu (zoals biosferische waarden), maar niet omwille van het realiseren van een groepsdoel, omdat een groep extrinsiek is aan het zelf. Omdat we hebben beredeneerd hoe intrinsieke motivatie zou kunnen voortvloeien uit de groep, vroegen we ons vervolgens af: hoe zouden verschillende operationalisaties van sociale beïnvloeding intrinsieke motivatie kunnen beïnvloeden? Met andere woorden, zijn er specifieke criteria waaraan sociale beïnvloeding moet voldoen om intrinsieke motivatie te bevorderen?

We verwachtten dat de waarschijnlijkheid waarmee sociale beïnvloeding intrinsieke motivatie zou bevorderen—naast dat het uit een groep moest komen waarmee iemand zich sterk identificeert—ook af zou hangen van het *type* sociale beïnvloeding. In dit proefschrift maakten we onderscheid tussen vijf vormen van sociale beïnvloeding, die we hebben getest in de drie empirische hoofdstukken: descriptieve normen en groepsbelang in Hoofdstuk 2, descriptieve normen, injunctieve normen en groepsbelang in Hoofdstuk 3, en groepsdoelen en toezicht in Hoofdstuk 4.

Deze vormen van sociale beïnvloeding verschilden van elkaar op de volgende kenmerken: 1) de mate waarin ze het *belang* van het groepsdoel uitdrukten, 2) de mate waarin het groepsdoel met minimale groepsdruk werd geuit, en 3) de mate waarin het groepsdoel op hetzelfde niveau van specificiteit werd geformuleerd als het uit te voeren gedrag. We redeneerden dat de kans dat sociale beïnvloeding in een groep tot intrinsieke motivatie voor duurzaam energiegedrag leidt groter is naarmate sociale beïnvloeding positiever scoort op de bovenstaande drie dimensies. Wij toetsten onze hypothesen in twee veldstudies (Hoofdstukken 2 en 3) en twee experimenten (Hoofdstuk 4) en vatten hieronder onze belangrijkste bevindingen en conclusies samen.

Wij vonden dat groepsidentificatie een minder belangrijke rol speelde in de mate waarin sociale beïnvloeding een positief effect had op intrinsieke motivatie dan verwacht. Wij vonden namelijk inconsistent bewijs voor de hypothese dat een sterke groepsidentificatie het effect van sociale beïnvloeding op intrinsieke motivatie voor duurzaam energiegedrag zou versterken in Hoofdstukken 2 en 3. In plaats van een versterkend (moderatie) effect, vonden we in een aantal gevallen juist dat groepsidentificatie een *direct* effect had op intrinsieke motivatie. Dit komt waarschijnlijk door het feit dat inwoners van een duurzame buurt, en deelnemers aan een lokaal energie-initiatief, intrinsiek gemotiveerd zijn om duurzaam energiegedrag te vertonen, waardoor er een directe relatie bestaat tussen hun groepsidentiteit en hun intrinsieke motivatie voor duurzaamheid.

Wij vonden verder dat het *type* sociale beïnvloeding een minder belangrijke rol speelde in de mate waarin sociale beïnvloeding een positief effect had op intrinsieke motivatie. We vonden namelijk in Hoofdstuk 3 dat zelfs de meer extrinsieke vormen van sociale beïnvloeding zoals injunctieve normen intrinsieke motivatie positief konden beïnvloeden. Wel vonden we dat de meer intrinsieke vorm van sociale beïnvloeding (vooral groepsbelang) een sterkere positieve relatie had met intrinsieke motivatie en gedrag dan de meer extrinsieke vormen van sociale beïnvloeding (vooral descriptieve norm). Hoe meer men zich identificeerde met de groep, des te sterker het effect was van groepsbelang op intrinsieke motivatie en gedrag, maar we vonden dit alleen voor de deelnemers van het lokale energie-initiatief (in Hoofdstuk 3), en niet voor de buurtbewoners in het algemeen (in Hoofdstuk 2).

De bevinding dat meerdere vormen van sociale beïnvloeding een positief effect kunnen hebben op intrinsieke motivatie kan wellicht niet zomaar worden gegeneraliseerd naar alle situaties. De veldstudies van Hoofdstukken 2 en 3 vonden namelijk plaats in een zogenaamde in-groep, oftewel een kleine, exclusieve groep mensen met een gedeelde interesse of identiteit—in ons geval een duurzame buurt en een lokaal energie-initiatief, respectievelijk. De experimentele studies in Hoofdstuk 4 lieten namelijk zien dat *juist* de in-groep context een bepalende factor is voor de mate waarin sociale beïnvloeding een positief effect heeft op intrinsieke motivatie en gedrag.

De experimentele studies van Hoofdstuk 4 stelden ons in staat om de effecten te meten van sociale beïnvloeding op de mate waarin participanten zich over drie opeenvolgende momenten inspanden ten behoeve van een duurzaam energiedoel van de groep. We maakten onderscheid tussen een meer intrinsieke vorm van sociale beïnvloeding: een groepsdoel, en een meer extrinsieke vorm van sociale beïnvloeding: toezicht, en varieerden voor beide vormen van sociale beïnvloeding of ze uit een in-groep of uit-groep kwamen (een uit-groep is het tegenovergestelde van een in-groep, een groep waarmee iemand zich niet identificeert).

Wij vonden dat participanten zich meer inspanden over tijd (onze proxy voor blijvende gedragsverandering) wanneer ze niet onder toezicht stonden en wanneer ze werkten om een in-groepsdoel te vervullen in plaats van een uit-groepsdoel. Dit betekent dat een intrinsieke vorm van sociale beïnvloeding (een groepsdoel), vooral intrinsieke motivatie versterkt en gedrag in overeenstemming met het groepsdoel teweegbrengt in een in-groep en niet in een uit-groep.

Hoewel we vooral negatieve (extrinsiek motiverende) effecten vonden van toezicht in Hoofdstuk 4, was er wederom een verschil in wat het effect van toezicht was op langetermijn gedrag in een in-groep, vergeleken met een uit-groep. Wij vonden namelijk dat wanneer toezicht werd geïntroduceerd en vervolgens verwijderd in de uit-groepsdoel conditie, daarmee ook alle motivatie verdween om zich verder in te spannen. Terwijl wanneer toezicht werd geïntroduceerd en vervolgens verwijderd in de in-groepsdoel conditie, inspanning eerst afzwakte maar vervolgens op het laatste meetmoment weer begon toe te nemen (ten opzichte van het beginpunt). Dit betekent dat hoewel de meer extrinsieke vorm van sociale beïnvloeding (in dit geval toezicht) gedragsverandering op lange termijn ondermijnt, deze ondermijning *minder* sterk is wanneer toezicht uit een in-groep komt, dan wanneer toezicht uit een uit-groep komt.

Wij concluderen daarom dat de vraag of sociale beïnvloeding intrinsieke motivatie en gedrag positief kan beïnvloeden—en een blijvende gedragsverandering teweeg kan brengen—voornamelijk afhangt van de vraag of sociale beïnvloeding uit een in-groep of uit een uit-groep komt. Wij vonden in

dit proefschrift dat meerdere vormen van sociale beïnvloeding een positief effect op intrinsieke motivatie konden hebben in een specifieke in-groep zoals een lokaal energie-initiatief. Wij vonden verder dat meer intrinsieke vormen van sociale beïnvloeding (zoals groepsbelang) het al positieve effect van sociale beïnvloeding op intrinsieke motivatie in een in-groep konden versterken én dat deze versterking nog meer van toepassing was op groepsleden die zich sterk identificeerden met de in-groep.

Dankwoord

Acknowledgments

Een proefschrift schrijft zich niet vanzelf. En ook in het schrijven ben je als promovendus niet alleen. Dit proefschrift is het resultaat van een jarenlange samenwerking met mijn twee promotoren: prof. dr. Linda Steg en prof. dr. Russell Spears. Ik wil jullie beiden hartelijk bedanken voor alle steun en feedback door de jaren heen. Dankzij jullie ben ik een betere schrijver en denker geworden.

Linda, bedankt voor je veelvuldige commentaar en aandacht voor de tekst en hoe mijn gedachten overkomen op de lezer. Hoe confronterend het ook is om iedere keer weer een document vol met rode markeringen te openen, het veelvuldige herschrijven heeft me geleerd om helder op papier te denken. Dank voor je volharding in het geven van commentaar, ik heb daardoor geleerd mijzelf te overwinnen en ben in mijn vak gegroeid.

Russell, bedankt voor je waardevolle bijdragen aan ons experimenteel onderzoek. Van jou heb ik meer over experimentele onderzoeksanalyse geleerd, evenals dat het volkomen terecht is om op je intuïtie te vertrouwen bij de ontwikkeling van theorie. Dank voor je luchtigheid en wijsheid.

Beste projectleden van ons mooie “Smart grid: rendement voor iedereen!” initiatief, beste Irene ten Dam, Elwin ter Horst, Petra de Boer, Robin Berg, Ton Jansen, Carolien van Hemel, Wilfried van Sark, Paul Raats, Timme van Melle, Vera Haaksma, Maarten van der Kloot Meijburg, Ruut Schalij, Remko van der Lugt, Lisette Kaupmann, Bart Hellings, Erwin Veldhuizen, Floris Bruning,

Mark Brenninkmeijer, Mark Schutz, Renee Heller en Floortje Alkemade, bedankt voor jullie samenwerking in dit uitdagend en leerzaam project waarin ik leerde om het zakelijke met het academische te verbinden en theoretische concepten om te zetten naar concrete toepassingen. En niet te vergeten alle ambassadeurs en bewoners van AmersVolt, bedankt voor jullie deelname aan mijn onderzoek en de veldstudies van dit project, jullie rol is onmisbaar geweest in het tot stand komen van dit proefschrift. Ik heb door jullie deelname veel geleerd over sociale initiatieven en intrinsieke motivatie.

Ook de lab-experimenten van dit proefschrift zijn een voorbeeld van samenwerking tussen collega's van verschillende afdelingen waar ik dankbaar voor ben. Mark Span, bedankt voor je hulp bij het programmeren van de energieproductietaak. Ruud den Hartigh, bedankt dat ik je meetapparatuur en roeimachines mocht gebruiken voor mijn experiment. Jule Hohmann, bedankt voor je inzet als proefleider van de tweede roeistudie tijdens je masterthese. Jullie hebben het doen van onderzoek makkelijker en plezieriger gemaakt.

Dan, een speciaal bedankje voor Margriet Braun. De eerste stap op deze onderzoeksreis zette ik toen jij mij tijdens het onderzoekspracticum aanraadde om onderzoeksassistent te worden bij de afdeling Sociale Psychologie. Bedankt voor dat eerste zetje!

Beste collega omgevingspsychologen, lieve Annemijn, Berfu, Cobus, Daniel, Danny, Ebru, Elisabeth, Ellen, Elliot, Ernst, Goda, Jan-Willem, Janet, Josefine, Kees, Leonie, Leonie, Lise, Martijn, Nadja, Nadja, Nieke, Susie en Thijs, bedankt voor een hele sociale werkomgeving en de lol die we als onderzoeksgroep hadden. Ook de sociale psychologiegroep, jullie ook bedankt voor de mooie tijd en een gezellige inter-afdeling integratie op de vele (promotie)feestjes. Jan-Willem en Leonie, nog in het bijzonder bedankt voor alle geestverruimende filosofische gesprekken die we voerden, dat zijn wat mij betreft de eerste (en leukste) stappen in de zoektocht naar kennis.

Lieve kamergenoten: Cobus, bedankt voor alle humor die we hadden en de "goede" ideeën voor experimenten die nooit iets zijn geworden. We hebben het gelukkig weten te compenseren door een bruisend sociaal leven op de faculteit. Annemijn, bedankt voor je warmte en deelgenootschap aan de uitdagende reis

dat het promoveren is. Ik hoop dat ons meer mooie overwinningen in de toekomst te wachten staan.

Piermario, Vanja, Nita, Jill, Isabella, Susie, Faris, Maja, Nitin, thank you for the gift of friendship during this PhD. I had a wonderful time with you in Groningen, as well as during the Environmental Psychology Summer Schools in Århus and Alghero. And who could forget the many conferences we attended, of which ICAP Paris was a highlight. Special thanks to my fratello Piermario for staying in touch—may we share more great times!

Iedereen die van de zijlijn heeft meegekeken, lieve vrienden en collega's, hier is-ie dan eindelijk, het resultaat van mijn jarenlange hobby. Een aantal speciale bedankjes zijn ook voor jullie. Pieter, weet dat ik onze gesprekken erg waardeer en je aanmoedigingen enorm op prijs stel tijdens al mijn avonturen, waaronder ook dit PhD. Ik ben trots dat jij mijn vriend en paranimf bent. Fokke, onze gesprekken eerder in het promotietraject waren een onmisbare steun, bedankt! John, ook jij hebt een belangrijke rol gespeeld in de laatste jaren van het proefschrift en gaf mij de nodige zetjes in de rug om de laatste fase van het schrijfproces aan te gaan, ik waardeer het zeer. Wico, bedankt voor het wegwijzen van de weg na de PhD en voor alle geestverruimende filosofische gesprekken in de praktijk—die we hopelijk kunnen voortzetten!

Lieve broer, jouw grenzeloze steun, je no-nonsense houding in onze gesprekken en gedeelde ambities om alles uit jezelf te halen hebben me geholpen om focus te houden op wat belangrijk is. Samen met jou werken, denken en plannen maken is een plezier en een voorrecht. Ik ben er trots op dat jij mijn broer en paranimf bent.

Lieve moeder, jouw onuitputtelijke steun heeft me door vele uitdagingen geloodst. Woorden schieten tekort om je te bedanken voor alle duwtjes in de rug, alle wijze lessen en geen genoeg nemen met minder dan mijn beste zelf. Jij leerde me om een goede ouder te zijn en te vechten voor wat belangrijk is.

Lieve dochter, op een dag zal je voor je eigen ambities en uitdagingen staan en dan hoop ik dat ik jou net zo kan inspireren om het beste uit jezelf te halen, zoals jij nu bij mij doet—alle liefs voor jou.

About the Author

Marko Milovanović (1985, Split) was born in the seaside capital of the Dalmatian province of Croatia. After spending his early childhood in Split, he moved with his family to the Netherlands at age 12 and finished his secondary education in Groningen, at the Rölling College Belcampo in 2004. Marko studied Psychology at the University of Groningen from 2004 to 2011. During this time he competed in the national student rowing competition with the A.G.S.R. Gys Men's Eight in 2007, worked as a research assistant in the Social Psychology lab from 2007 to 2009, and taught the SPSS practicum at the Hanzehogeschool from 2008 to 2012. He graduated in the field of Environmental Psychology with prof. dr. Linda Steg in 2011, and reached the finals for the GAP Master Thesis prize for his thesis on how moral behaviour can be influenced by goal frames. Marko started working as a researcher for the Environmental Psychology Group in 2012 and began his PhD project on how intrinsically motivated behaviour can manifest in groups with prof. dr. Linda Steg and prof. dr. Russell Spears later that year. Since May 2017, Marko has been working as a consultant for KPN.

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