

Martin S. Hagger

The Trans-Contextual Model of Motivation

An Integrated Multi-Theory Model to
Explain the Processes of Motivational
Transfer across Contexts



STUDIES IN SPORT, PHYSICAL EDUCATION AND HEALTH 203

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ABSTRACT

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The present thesis presented and applied an integrated multi-theory *trans-contextual model* of motivation to examine the process by which school student's self-determined or *autonomous* motivation in physical education (PE) contexts is *transferred* to motivation to engage in leisure-time physical activity. The model also inspired the development of a comprehensive integrated model of health-related behaviour change. The trans-contextual model combines hypotheses from self-determination theory, the theory of planned behaviour, and the hierarchical model of motivation into an integrated model. The thesis reports three empirical tests of model using a unique three-wave prospective design in eight independent samples of school students aged 13-16 years from seven countries. The thesis also comprises three reviews of key conceptual issues related to the model and how it can form the basis of future research and integrated health behaviour theories. Results of the empirical studies supported the key premises of the model. Perceived autonomy support from teachers predicted autonomous motivation in PE as well as autonomous motivation, social-cognitive beliefs, intentions, and physical activity behaviour in a leisure-time physical activity context. Collectively, the studies supported the proposed 'motivational sequence' of the model. The reviews highlight the consistency of findings of the empirical research on the model, identify critiques of the model and provide possible solutions, provide support for the model via a meta-analysis, and outline how one aspect of the trans-contextual model, the integration of self-determination theory and the theory of planned behaviour, forms the basis of a generalised model of behaviour change incorporating volitional and implicit influences.

Keywords: theory of planned behaviour, self-determination theory, trans-contextual model, autonomous motivation, self-determined motivation, physical activity intentions, path analysis, theoretical integration, dual-process model, dual-systems theory

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This thesis represents a culmination of work conducted over a number of years focused on the question as to whether children's motivation in PE is related to their motivation toward physical activity outside of school in their leisure time. This is clearly an important question and I realized early on in my career that school PE represents an obvious network for interventions to promote physical activity in children for health benefits. The work resulted in the trans-contextual model, a framework for research and interventions to increase motivation toward physical activity in children and to promote their increased engagement in these activities in future. I view the model as a 'living' framework that is flexible and modifiable, in the spirit of Ajzen's (2004) suggestion, provided additional components are theoretically justifiable and add significantly to explained variance in intentions and behaviour. I would like to extend my gratitude to the University of Jyväskylä for providing me with the opportunity to synthesise my work on the development of the Trans-Contextual Model and integrated models of behaviour change as a doctoral thesis.

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LIST OF ORIGINAL PUBLICATIONS

The thesis is based on the following original publications, which will be referred to by their Roman numerals.

- I Hagger, M. S., Chatzisarantis, N. D. L., Culverhouse, T., & Biddle, S. J. H. (2003). The processes by which perceived autonomy support in physical education promotes leisure-time physical activity intentions and behaviour: A trans-contextual model. *Journal of Educational Psychology, 95*, 784-795.
- II Hagger, M. S., Chatzisarantis, N. L. D., Barkoukis, V., Wang, C. K. J., & Baranowski, J. (2005). Perceived autonomy support in physical education and leisure-time physical activity: A cross-cultural evaluation of the trans-contextual model. *Journal of Educational Psychology, 97*, 376-390.
- III Hagger, M. S., Chatzisarantis, N. L. D., Hein, V., Pihu, M., Soós, I., Karsai, I., Lintunen, T. & Leemans, S. (2009). Teacher, peer, and parent autonomy support in physical education and leisure-time physical activity: A trans-contextual model of motivation in four nations. *Psychology and Health, 24*, 689-711.
- IV Hagger, M. S., & Chatzisarantis, N. L. D. (2012). Transferring motivation from educational to extramural contexts: A review of the trans-contextual model. *European Journal of Psychology of Education, 27*, 195-212.
- V Hagger, M. S., & Chatzisarantis, N. L. D. The trans-contextual model of motivation in education: clarification of conceptual and empirical issues and meta-analysis. Submitted.
- VI Hagger, M. S., & Chatzisarantis, N. L. D. (2014). An integrated behavior-change model for physical activity. *Exercise and Sports Sciences Reviews, 42*, 62-69.

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1 INTRODUCTION

1.1 Theoretical approaches to physical activity and the health in young people

There is increasing evidence indicating a high prevalence of health problems such as obesity and cardiovascular disease risk factors in young people which predispose them to chronic illnesses in late in life (Armstrong, Balding, Gentle, & Kirby, 1990; Berenson, 1986; Craig, Love, Ratcliffe, & McNeill, 2008). Low levels of physical activity along with a diet rich in energy-dense foods and dietary fat have been mooted as important contributory factors to the advent of these health problems, and researchers have highlighted that the link between these health conditions and health-related behaviours like physical activity. This has been corroborated by research which has highlighted the importance of physical activity to children's health (Bar-Or, 2000; Rowland, 1990; Sallis & Patrick, 1994; Sallis et al., 1992; Simons-Morton, O'Hara, Simons-Morton, & Parcel, 1988). Unfortunately, young people in many countries do not engage in sufficient physical activity of the type, intensity, duration and frequency likely to bring about health benefits (Armstrong, 1989; Cale & Almond, 1992; Centers for Disease Control and Prevention, 2003; Sleaf & Warburton, 1992; Vincent & Pangrazi, 2002).

Recognising these low levels of physical activity, researchers have adopted various social psychological models and theories to identify the antecedents of physical activity participation in young people and determine the reasons why young people do not engage in sufficient physical activity (Brawley, 1993; M. Conner & Norman, 1998). Such theoretical approaches aim to provide a hypothesis-testing framework and an evidence base to enable researchers to identify a core set of factors that might be related to physical activity participation (Hagger & Chatzisarantis, 2009a). This is an important endeavour as it enables researchers to pose questions of psychological and behavioural data and identify the factors which, if changed as the result of an intervention, will lead to the greatest changes in actual behaviour. A key part of this process is not only the

identification of the psychological factors that influence physical activity participation, but also identifying the mechanisms and processes by which these factors influence participation (Hagger, 2010). It is therefore important that psychological approaches to understanding physical activity behaviour, also take into account the processes involved, including factors that mediate (explain) and moderate (change) relations between social-cognitive variables and actual behaviour. A growing body of research has demonstrated the increased effectiveness of behavioural interventions based on social psychological theory in bringing about health behaviour change (Gardner, Whittington, McAteer, Eccles, & Michie, 2010; Michie & Prestwich, 2010). Given the success of such theory interventions targeting the theory-based constructs associated with health behaviour, it is important to identify such factors, the mechanisms by which they exert their effects, and, importantly, the most effective means to deliver these interventions (Hagger, 2009). The current thesis focuses on all three of these issues with respect to promoting physical activity in young people, particularly the factors that are associated with increased physical activity at home in young people's leisure time and the role that an existing network that allows access to a majority of young people, school physical education (PE), can play in delivering messages to motivate children to be more active outside of school.

1.2 Physical activity and physical education

An important question for any school educator is whether his or her instruction will affect pupils outside the school environment. Educators are interested whether pupils apply the knowledge and skills they have learned in educational contexts to out-of-school contexts. The same principle of transfer from educational to extramural contexts can be applied to fostering important psychological attributes that enhance learning and persistence and lead to adaptive educational outcomes outside school. An excellent example is physical educators interested in promoting physical activity participation outside of school. Physical educators are often faced with the question as to the extent of the influence of their teachings on the activities and behaviour of children outside of school in a leisure-time context. If a key aim of school PE is to provide children with important life skills to assist optimal adaptation in their future life, then promoting health-related physical activity through teaching in PE should be a key goal. This goal has been reflected in recent PE curricula, which has resulted in some content that incorporates health-related physical activity.

A key psychological attribute implicated in the transfer of motivation and behaviour across contexts is self-determined or *autonomous* motivation derived from self-determination theory. There is considerable support for the link between student autonomous motivation in educational settings and adaptive educational outcomes such as persistence in the classroom and academic attainment (Deci, Vallerand, Pelletier, & Ryan, 1991; Reeve, 2002). Autonomous motivation, defined as engaging in a behaviour for personally-valued reasons

that service innate psychological needs for autonomy, is considered adaptive as it leads students to pursue activities out of a sense of interest and, most importantly, in the absence of any externally-referenced contingency (e.g., deadlines, rewards) (Deci, Eghrari, Patrick, & Leone, 1994; Deci & Ryan, 2000; Reeve & Jang, 2006). The significant link between autonomous motivation in the educational contexts and academic attainment implies that pupils will be motivated to pursue school-related activities not only within school but also in out-of-school contexts as academic attainment requires more than application in school alone (e.g., a student also needs to complete homework assignments and do additional reading or visit the library outside of formal lessons). This implies that autonomous motivation within a school context may transfer to extramural contexts, and this link is critical as a basis for the proposed research conducted in current thesis.

1.3 Introducing the *trans-contextual model*

The purpose of the research conducted in this thesis is to develop a theoretical model to test this hypothesis of transfer of motivation from educational to out-of-school contexts that has not been previously addressed in the literature. Specifically, a *trans-contextual model* of motivation will be developed that specifies the processes by which motivation in an educational context is transferred to motivation for activities performed outside of school and, importantly, to future intended behaviours to achieve key adaptive outcomes. The focus of the model will be on PE context and the key outcome variables will be motivation toward engaging in physical activity in an extra-mural context (i.e., outside of school), intentions to engage in extra-mural physical activity, and actual physical activity behaviour outside of school. The model was based on the tenets of self-determination theory (Deci & Ryan, 1985, 2000), the theory of planned behaviour (Ajzen, 1985, 1991), and Vallerand's (1997, 2000; 2007) hierarchical model of intrinsic and extrinsic motivation.

In the thesis I will develop, test, and replicate the trans-contextual model in PE and out-of-school leisure-time physical activity contexts, and synthesise the empirical tests of the model across the literature. In particular, the key processes proposed in the model, namely, the transfer of forms of motivation from self-determination theory across context and the relationship between self-determined or *autonomous* motivation in extramural contexts and the psychological antecedents of intended action will be identified and elucidated. The thesis will report on a series of quantitative longitudinal empirical tests of the trans-contextual model to provide support for the model hypotheses through. The studies will include an initial test (Study 1), follow-up replications in multiple samples across cultures (Study 2), and tests of the model when perceived support for autonomous motivation toward physical activity from peers and parents is accounted for (Study 3). In addition, I will also conduct narrative

(Study 4) and empirical (Study 5) reviews of research adopting the trans-contextual model and integrated hypotheses from self-determination theory and the theory of planned behaviour to explain the transfer of motivation from educational contexts to leisure-time contexts. The reviews will incorporate the tests of the model reported in the current thesis as well as those conducted in other laboratories and research groups. Responses to cited critiques of the model and possible solutions will also be outlined (Study 5). A final conceptual review (Study 6) will use theoretical integration outlined in the trans-contextual model as a basis to develop a generalised comprehensive integrated behaviour-change model. The model will incorporate hypotheses from dual-process models and dual-systems theories to account for volitional and implicit processes in the explanation of health behaviour. I plan to conclude the thesis by highlighting the importance of motivational transfer from PE to physical activity in out-of-school contexts in the trans-contextual model and how the model assists in identifying the processes involved. I will also identify the key gaps in the literature with respect to the trans-contextual model and what additional research will need to be conducted in future to fill these gaps.

2 REVIEW OF THE LITERATURE

2.1 Theory-based approaches to health behaviour

Applied social psychology is a theory-rich discipline with many motivational theories and models proposed to provide comprehensive and definitive explanations of behaviour (Hagger, 2010, 2014). It is, however, important to note that many of these theories have similar components and hypotheses, such that there is considerable overlap in the definitions of constructs and the proposed mechanisms by which these constructs affect physical activity behaviour (Hagger, 2009). For example, *self-efficacy*, a very important construct in the field of social psychology and derived from Bandura's (1977b, 1989) influential social cognitive theory, is a key component in numerous theories of motivated social behaviour such as protection motivation theory (Rogers, 1975) and the theory of planned behaviour (Ajzen, 1985) and both have been applied to physical activity (Hagger, Chatzisarantis, & Biddle, 2002b; Rhodes, Plotnikoff, & Courneya, 2008). Similarly, the construct of *intention*, which is a motivational construct reflecting the degree of effort and planning an individual is prepared to invest in pursuing a behaviour, is also a key component of numerous theories such as the theory of planned behaviour, protection motivation theory, the theories of self-regulation and trying (Bagozzi & Kimmel, 1995), and the theory of goal-directed behaviour (Perugini & Conner, 2000). Again these theories have been adopted to explain behaviour in a physical activity context (Bagozzi & Kimmel, 1995; Perugini & Conner, 2000). Similarly, these theories have different assumptions and perspectives. For example, attitudinal theories like the theory of planned behaviour are belief based, and focus on behavioural predictions based on estimates of the future outcomes of a given behaviour and individuals' evaluation of those outcomes. In contrast, theories such as self-determination theory (Deci & Ryan, 1985, 2000) adopt an organismic approach, steeped in the humanist tradition, focusing on the contextual predictors of motivated behaviour and motivational orientations derived from the satisfaction of innate psychological needs. In this section I will focus on two key theories applied to explain physi-

cal activity behaviour: the theory of planned behaviour and self-determination theory. I will outline how the adoption of these theories has contributed to the understanding of health behaviour, particularly physical activity. I will also review how these theories have been used as component theories in the development of integrated, comprehensive theories that aim to explain the antecedents and mechanisms that underpin health-related behaviour and as the basis for informing interventions and practical solutions to increase behavioural engagement. Specifically, I will demonstrate how these theories have contributed to the development of integrated models in general and, specifically, the focus of the current thesis: the trans-contextual model.

2.1.1 The theory of planned behaviour

The theory of planned behaviour (Ajzen, 1985, 1991; Fishbein & Ajzen, 2009) is a widely-adopted social cognitive theory aimed at explaining intentional behaviour. It has been applied to many health-related behaviours (Hagger et al., 2002b; Symons Downs & Hausenblas, 2005). In the theory, intention is considered a motivational construct and represents the degree of planning and effort people are willing to invest in performing any future planned action or behaviour. Intention is conceptualized within the theory as the most proximal antecedent of behaviour and is a function of a set of personal, normative, and control-related belief-based social-cognitive constructs regarding the performance of the future behaviour, termed *attitudes*, *subjective norms*, and *perceived behavioural control*, respectively.

Attitudes refer to an individual's overall evaluation of the behaviour and are usually tapped using *direct* measures and psychometric scales (Ajzen, 2003b). However, the sets of personal beliefs that the target behaviour will result in outcomes (behavioural beliefs) and whether such outcomes are salient (outcome expectations) are hypothesized to underpin the direct attitude measure (Ajzen, 2003b). These can also be measured individually for each belief and outcome and are considered *indirect* measures of attitude. Similarly, subjective norms are typically measured directly as a person's overall evaluation that significant others would want them to engage in the target behaviour. As with attitudes, subjective norms are sourced indirectly from sets of beliefs that reflect expectations that significant others will exert pressure or cajole the individual to engage in the behaviour (normative beliefs) and the individual's propensity to comply with those significant others (motivation to comply). The construct of perceived behavioural control encompasses control-related perceptions with respect to the target behaviour including actual barriers and personal evaluations of limitation or capacity with respect to the behaviour. This led Ajzen to indicate that perceived behavioural control contained elements of Bandura's (1977a) self-efficacy construct in that it captures judgments of how well one can execute required actions to produce important outcomes. The construct is also underpinned by a set of beliefs (Ajzen, 1985). *Control beliefs* refer to the perceived presence of factors that may facilitate or impede performance of behaviour and *perceived power* refers to perceived impact facilitative or inhibiting fac-

tors may have on performance of behaviour (Ajzen & Driver, 1991). An indirect measure of perceived behavioural control is formed from the composite of the control beliefs multiplied by its perceived power (Ajzen & Driver, 1991).

In terms of process and the operationalization of the model, intentions are hypothesized to lead directly to behaviour and mediate the effects of attitudes, subjective norms, and perceived behavioural control on behaviour. This means that intentions *explain* the effects of attitudes, subjective norms, and perceived behavioural control on behaviour. Intentions are therefore necessary to convert these constructs into behaviour. Ajzen (1985) also predicted direct and indirect effects for the perceived behavioural control construct on behaviour. The effects of perceived behavioural control that are mediated by intention reflect the level of perceived volitional control an individual has over the performance of the behaviour in future, similar to self-efficacy. However, if perceived behavioural control closely reflected the degree to which participation in the behaviour was impaired by real environmental barriers or impedances, the construct would serve as a 'proxy' measure of actual control and directly affect behaviour unmediated by intention.

The most-frequently cited or 'modal' beliefs that underpin the attitude, subjective norms, and perceived behavioural control constructs in physical activity contexts have been identified. The beliefs are typically elicited from pilot research using open-ended measures that are content-analyzed to provide sufficient information to develop the salient outcomes for the behavioural belief and outcome evaluation measures, the salient referents for the normative belief and motivation to comply measures, and the salient barriers and control-related issues for the control beliefs and perceived power measures (Ajzen & Fishbein, 1980). For example, research in physical activity has typically identified the following most frequently-cited (modal) outcomes: "good companionship", "weight control", "benefit my overall health", "take too much time", "fun", "get fit", "stay in shape", "improve skills", "get an injury", and "makes you hot and sweaty" (Hagger, Chatzisarantis, & Biddle, 2001). Similarly, important referents identified include friends, colleagues and family members like parents, grandparents, and siblings (Hagger, Chatzisarantis, & Biddle, 2001). The modal control beliefs identified include barriers and facilitators that underpin the direct measure of perceived behavioural control: "bad weather", "age", "heart pain", "costs", "fatigue", and "no time" (Godin, Valois, Jobin, & Ross, 1991). As with behavioural and normative beliefs, research shows that control beliefs demonstrate considerable variance across different populations and behaviours. For example, studies in the physical activity domain have identified "age" and "fear of having a heart attack" among the control beliefs for older and clinical populations (Godin et al., 1991), but these beliefs do not feature among the control beliefs of younger populations who focus more on inclement weather and lack of time (Hagger, Chatzisarantis, & Biddle, 2001). Interestingly, the comparatively limited research examining relations between the indirect belief-based measures and the direct measures suggests that multiplicative composites of the belief and value systems do not account for a high degree of variance in the

direct measures of attitudes, subjective norms, and perceived behavioural control (Hagger, Chatzisarantis, & Biddle, 2001). Few definitive solutions have been put forward for this problem, and the role of beliefs and expectancy-value models within the theory of planned behaviour is an area of surprisingly sparse attention in the literature (Ajzen & Fishbein, 2008; Bagozzi, 1984; French & Hankins, 2003).

Formative research adopting the theory of planned behaviour in health contexts has demonstrated that attitudes and perceived behavioural control consistently and significantly predict intentions and explain approximately equal proportions of the variance in health behaviour with a substantially lesser role for subjective norms (Albarracín, Johnson, Fishbein, & Muellerleile, 2001; Hagger et al., 2002b; McEachan, Conner, Taylor, & Lawton, 2012). In addition to individual empirical studies, a meta-analysis of studies applying the theory of planned behaviour in health contexts have supported the trends in the physical activity data across the literature (Hagger et al., 2002b). Results of these syntheses have generally supported the theory with intention found to be the sole proximal predictor of health-related behaviour with effects for attitudes and perceived behavioural control on intentions medium in size and stronger than the effect for subjective norms. In McEachan et al.'s (2012) recent meta-analysis, the theory was found to be more effective in predicting health-promoting behaviours such as physical activity and diet with 23.9% and 21.2% variance explained in the behaviours across the studies, respectively. In contrast, health compromising behaviours and behaviours associated with minimising risk tended to be less well predicted by the variables in the theory. Specifically, risk detection, safer sex, and abstinence from drugs behaviours tended to be less well predicted by the theory with between 13.8 and 15.3% variance in the behaviours explained. In addition, past behaviour has also been shown to be an important predictor of theory constructs and tends to attenuate their relations with intention and behaviour. This is because past behaviour usually represents previous patterns of decision making. Nevertheless, in meta-analyses of theory of planned behaviour research, the relationships of social cognitive constructs with intentions and behaviour tend to remain even after controlling for past behaviour (Albarracín et al., 2001; Hagger et al., 2002b). This indicated that previous decision-making processes were accounted for by the variables in the model, but the most recent decision-making variables remained salient as explanations of variance in health-related intentions and behaviour.

This evidence indicates the general recognition of theory of planned behaviour as an important theoretical approach to the understanding of the motivational predictors of health-related behaviour. The considerable attention paid to the theory in the literature is likely due to its effectiveness in accounting for variance in intention and behaviour as well as its relative parsimony and role as a flexible framework for the study of the social-cognitive processes that underpin behaviour. For example, its role as a 'flexible framework' has been supported by research that has shown the attitude, subjective norm, and perceived behavioural control constructs mediate the effect of other distal constructs on in-

tentions and behaviour such as personality (Bozionelos & Bennett, 1999; Chatzisarantis & Hagger, 2008; Conner & Abraham, 2001; Conner, Rodgers, & Murray, 2007; Hoyt, Rhodes, Hausenblas, & Giacobbi, 2009; Rhodes & Courneya, 2003; Rhodes, Courneya, & Jones, 2002, 2003) and other individual difference variables (Chatzisarantis & Hagger, 2007; Fitch & Ravlin, 2005; Hagger, Anderson, Kyriakaki, & Darkings, 2007). However, researchers have also indicated that the theory does not account for all of the variance in intention and behaviour, nor does it mediate the effects of certain 'external variables' on intentions and behaviour (e.g., Bagozzi & Kimmel, 1995; Conner & Abraham, 2001; Conner & Armitage, 1998; Rhodes & Courneya, 2003; Rhodes et al., 2002; Sniehotta, Presseau, & Araújo-Soares, 2014). Paradoxically, this 'weakness' has become the theory's greatest strength. Ajzen (1991) states that the theory should be viewed as a *flexible framework* into which other variables can be incorporated provided they make a meaningful and unique contribution to the prediction of intentions and there is a theoretical precedence for the inclusion of such variables.

As a consequence, the theory has been adopted by researchers in health behaviour contexts including physical activity as a general framework to investigate the effect of a number of additional social cognitive constructs on intention and behaviour (Conner & Armitage, 1998; Hagger, Chatzisarantis, & Harris, 2006a; Phillips, Abraham, & Bond, 2003). To the extent that such constructs have a unique effect on intention or behaviour and are not mediated by the core theory variables of attitude, subjective norm, and perceived behavioural control, the researcher has evidence to support the inclusion of that construct within the theory. A number of constructs have been found to have a unique effect on intentions and/or behaviour including anticipated affect and attitude ambivalence (Armitage & Conner, 2000), anticipated regret (Sheeran & Orbell, 1999), cultural norms and ethnicity (Blanchard et al., 2008; Blanchard et al., 2009; Blanchard et al., 2003; Van Hooft & De Jong, 2009; Walker, Courneya, & Deng, 2006), descriptive norms (Sheeran & Orbell, 1999), group norms and membership (Terry, Hogg, & White, 2000; White, Hogg, & Terry, 2002), health locus of control (Armitage, 2003; Hagger & Armitage, 2004), moral norms (Godin, Conner, & Sheeran, 2005; Lam, 1999), past behaviour and habit (Albarracín & Wyer, 2000; M. Conner, Warren, Close, & Sparks, 1999; Gardner, 2014; Hagger, Chatzisarantis, & Biddle, 2001; Verplanken, Aarts, & van Knippenberg, 1997), prototypes (Norman, Armitage, & Quigley, 2007), self-identity (Hagger & Chatzisarantis, 2006), and self-schemas (Sheeran & Orbell, 2000).

In addition to the effects of other constructs, relations between variations in the characteristics and nature of the core theory of planned behaviour constructs and intentions, and between intention itself and behaviour have been investigated (Sheeran, 2002). Examples include the stability of intentions (Sheeran, Orbell, & Trafimow, 1999), the accessibility of attitudes (Doll & Ajzen, 1992; Verplanken, Hofstee, & Janssen, 1998), and hypothetical bias (Ajzen, Brown, & Carvahal, 2004). In addition, researchers have sought to differentiate between the independent and fundamental concepts within each of the psycho-

social components that predict intentions. For example, attitudes have been differentiated into cognitive or instrumental attitudes and affective attitudes (Lowe, Eves, & Carroll, 2002; D. Trafimow & Sheeran, 1998), subjective norms have been differentiated into injunctive norms and descriptive norms (Rivis & Sheeran, 2003), and, as mentioned previously, perceived behavioural control has been differentiated into self-efficacy and perceived controllability (C. J. Armitage & Conner, 1999a, 1999b; Hagger, Chatzisarantis, & Biddle, 2001; Povey, Conner, Sparks, James, & Shepherd, 2000; Sniehotta, Scholz, & Schwarzer, 2005; Terry & O'Leary, 1995). Even intentions have been distinguished from desires, the latter being 'emotional' forms of intention (Perugini & Bagozzi, 2001, 2004). In the same vein, researchers have also investigated the extent to which individuals are orientated towards or base their intentions on each of the core theory constructs (Sheeran, Trafimow, Finlay, & Norman, 2002; D. Trafimow & Finlay, 1996). These modifications suggest that the antecedents of health-related behaviours may be more complex than originally conceived by the theory (Conner & Armitage, 1998). However, it is important to note that many of these modifications make relatively modest increases in the predictions within the model (Trafimow, 2004) and the separation of the theory components into more specific, differentiated constructs does not appear to affect the prediction of intentions and behaviour at the global level (Hagger & Chatzisarantis, 2005). Notwithstanding these modifications, the theory still performs relatively well in terms of explaining physical activity behaviour and in its most parsimonious form can inform successful interventions to promote physical activity (e.g., Chatzisarantis & Hagger, 2005; Darker, French, Eves, & Sniehotta, 2010).

Although the theory of planned behaviour has demonstrated considerable success in terms of predicting health-related behaviour in numerous contexts and groups, the theory and the research that has adopted it does have considerable documented limitations (Ogden, 2003; Sniehotta et al., 2014). First, the relationship between intentions and behaviour is far from perfect. In fact, it frequently falls considerably short of a large effect size and meta-analytic studies have typically indicated that the relationship between intentions and behaviour is relatively modest (Hagger et al., 2002b), perhaps medium in size, according to Cohen's (1987) taxonomy of effect sizes. Numerous reasons have been cited for this problem such as a lack of correspondence between the measures of intention and behaviour, the relative instability of intentions, and the moderating effect of numerous individual difference factors such as self-schema. These have been frequently investigated and research has shown that the intention-behaviour 'gap' is strengthened under conditions of high intention stability and among self-schematics (Sheeran & Orbell, 2000). However, the relationship remains relatively modest in effect size, which means that people frequently do not convert their 'good' intentions to engage in physical activity into actual behaviour. Researchers have therefore sought to develop strategies which might assist in moderating the intention-behaviour relationship, particularly strategies

that enable individuals convert their 'good' intentions to engage in physical activity behaviour into actual action (Hagger & Luszczynska, 2014).

2.1.2 Self-determination theory

Self-determination theory (Deci & Ryan, 1985, 2000) is a prominent motivational theory adopted to identify the contextual and interpersonal factors that underpin on human behaviour and is receiving increasing attention in the literature on health-related behaviour (Hagger & Chatzisarantis, 2007a, 2008, 2007c; Ryan & Deci, 2007). Self-determination theory is actually a meta-theory comprising a number of sub-theories that seek to explain human motivation and behaviour on the basis of individual differences in motivational orientations, contextual predictors of motivation, and interpersonal perceptions. Central to self-determination theory is the distinction between self-determined or *autonomous* forms of motivation relative to non-self-determined or *controlling* forms of motivation. The extent to which people experience motivation to engage in activities and behaviours as autonomous or controlling will determine their persistence with the behaviour in future and whether they gain certain adaptive outcomes such as satisfaction, enjoyment, and psychological well-being. Organismic integration theory (OIT), a sub-theory of self-determination, theory seeks to provide an explanation for the processes by which people assimilate behaviours that are externally regulated and incorporate them into their repertoire of behaviours that are self-determined and integrated into their personal system. OIT differentiates between different qualities of motivation conceptualized along a graduated continuum of motivational styles or *regulations*. The continuum, known as the perceived locus of causality, is characterized by two relatively autonomous forms of motivation: *intrinsic motivation* and *identified regulation*, and two relatively controlling forms of motivation: *external regulation* and *introjected regulation* (Ryan & Connell, 1989). Intrinsic motivation refers to engaging in behaviour for motives that emanate from the self, such as for the enjoyment, satisfaction, and fulfilment that behavioural engagement provides. Identified regulation represents engaging in a behaviour for reasons that are highly valued albeit external to the self. Introjected regulation describes engaging in a behaviour for contingent self-worth or to avoid negative outcomes such as guilt and shame (Deci & Ryan, 2000). Introjected regulation has been described as involving internal prods and pressures (Deci & Ryan, 2000) arising from conflict between the demand of the regulation and the individual's lack of interest in the behaviour itself. External regulation is the prototypical form of extrinsic motivation and refers to engaging in behaviour for the acquisition of rewards or avoidance of punishment. Important for researchers and practitioners in the field of physical activity, individuals who act for autonomous reasons, intrinsic motivation and identified regulation, are more likely to persist in the absence of discernable external rewards or contingencies. Therefore if interventions can promote autonomous motives for engaging in physical activity among individuals it is likely to lead to persistence over time and cede the health benefits of physical activity to those individuals.

Research adopting the perceived locus of causality from OIT has shown that autonomous forms of regulation are positively related to adaptive behavioural and psychological outcomes in health-related behaviour. Autonomous motivation is associated with health behaviour uptake and adherence over time (Barbeau, Sweet, & Fortier, 2009; Chatzisarantis, Biddle, & Meek, 1997; Chatzisarantis, Hagger, Biddle, & Karageorghis, 2002; Chatzisarantis, Hagger, Biddle, Smith, & Wang, 2003; Fortier & Kowal, 2007; Pelletier, Dion, Slovinec-D'Angelo, & Reid, 2004; Vansteenkiste, Simons, Soenens, & Lens, 2004), intentions (Hagger & Chatzisarantis, 2007b; Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003; Phillips et al., 2003; Standage, Duda, & Ntoumanis, 2005; Wilson & Rodgers, 2004), and psychological well being (Wilson & Rodgers, 2007). Furthermore, environmental antecedents such as autonomy support (Edmunds, Ntoumanis, & Duda, 2007) and people's perceptions that the motivational context is supportive of their autonomous motivation (Hagger, Chatzisarantis, Barkoukis, Wang, & Baranowski, 2005; Hagger et al., 2003; Hein & Koka, 2007; Koka & Hein, 2003; Standage et al., 2005) have also been linked with autonomous motivational regulations from OIT. Findings from previous research have been supported by a meta-analysis of the effects of perceived locus of causality on behaviour and outcomes in physical activity settings (Chatzisarantis et al., 2003). The analysis supported the proposed effects of the motivational regulations on behaviour and physical activity outcomes such as perceived competence and physical activity intentions across a set of 21 studies (Chatzisarantis et al., 2003). Interestingly, autonomous forms of motivation mediated the effect of perceived competence on physical activity intentions, suggesting that competence perceptions affect behaviour because competence perceptions tend to be self-determined in nature.

Another fundamental sub-theory of self-determination theory is Basic Needs Theory. Deci and Ryan (2000) suggest that the origins of self-determined motivation stem from individuals innate propensity to satisfy three basic psychological needs: *autonomy*, *competence*, and *relatedness*. These needs are perceived to be *fundamental* to all humans and people approach behaviours for autonomous reasons because they perceive it as being efficacious in satisfying psychological needs. The existence of these needs have been justified empirically and research has illustrated that these needs are pervasive across different cultures (Sheldon, Elliot, Kim, & Kasser, 2001). Basic needs theory is linked with OIT because it charts the origins of autonomous or self-determined motivational regulations. The perceived locus of causality is proposed to reflect the degree to which behaviours have become internalized or 'taken in'. Behaviours that have the propensity to fulfil personally-relevant goals that are valued by individuals are perceived as efficacious in satisfying psychological needs. Increased participation in such behaviours will likely lead to the behaviour being internalized and, finally, integrated into the person's repertoire of behaviours that satisfy these needs. As a result, people may not perform physical activity for the activity itself as in the 'classic' definition of intrinsic motivation. Rather, they perform it to achieve an intrinsic 'outcome' which is highly valued and perceived

as part of the person's 'true self'. This is consistent with integrated regulation, which is an autonomous form of motivation on the perceived locus of causality from OIT.

It is also important to note that the three basic needs are complimentary – that is, optimal functioning and truly integrated behaviour can only result if all three psychological needs are supported. For example, competence alone, i.e. mastering a technique or skilled action alone is not sufficient for a behaviour to be perceived to be need satisfying. Competence along with a perception that the behaviour is performed out of a true sense of self, without external contingency, perceived or real, and out of choice and volition (i.e., autonomously motivated) and that behavioural engagement is supported by others in an autonomous fashion (i.e., relatedness) is necessary for an action to be fully integrated and to support psychological needs. Research has suggested that the basic needs tend to be strongly correlated and can be subsumed by a single global factor (Hagger et al., 2006a; Ntoumanis, 2005; Standage et al., 2005) and interventions that provide synergistic support for the needs of autonomy, competence, and relatedness tend to result in greater behavioural engagement than support for each individual need alone (Deci et al., 1994). Overall, the satisfaction of basic psychological needs has been shown to be related to autonomous forms of motivation in health-related behavioural contexts from the perceived locus of causality consistent with self-determination theory (Edmunds et al., 2007; Hagger et al., 2006a; Standage, Gillison, & Treasure, 2007) and interventions supporting autonomous motivation were found to increase psychological need satisfaction as well as motivational regulations (Edmunds et al., 2007). While research examining the role of psychological need satisfaction as the origin of autonomous motivation in health behaviour, this research is relatively new and there is considerable scope for further investigation to answer questions relating to the role of needs in determining health-related behaviour.

2.1.3 Integrating the theories

Although the theory of planned behaviour has been criticised for its static view and operationalisation (Sniehotta et al., 2014), it has made a very useful contribution to understanding health related behaviour, and has paved the way for the development of more comprehensive theories and models of health behaviours (Ajzen, 2014). Such models frequently adopt the theory of planned behaviour as the 'starting point' of their predictions. This is consistent with the view that the theory serves as a 'flexible framework' to which new variables and associated processes can be added. It must, however, be stressed that not only should additional variables explain unique variance in behaviour above and beyond the other constructs in the model, but there should also be a clear theoretical basis for including additional variables in the model (Ajzen, 1998, 2011). So there has to be both conceptual and empirical bases for integrated models that adopt other constructs and hypotheses alongside the components from the theory of planned behaviour.

The trans-contextual model is precisely the kind of model that falls into this category. The model draws from these two prominent approaches that appear, on the surface, to have disparate and incompatible sets of constructs. However, I will demonstrate the virtues of integrating the two theories to arrive at a more comprehensive model. I will outline the conceptual basis for the integration, with clear reference to the development of the original theory, and how the integration not only serves to provide effective prediction of health-related intentions and behaviour, but how motivation from one context can affect motivation in other contexts. I will also demonstrate how we have incorporated hypotheses from each theory, as well as additional models, to explain the hypothesised predictions of the theory. Finally, the contribution of the theoretical integration in the trans-contextual model to the development of a more generalised model of health-related behaviour, that also incorporates dual-process models and dual-systems theories, will be outlined.

2.2 Basic tenets of the *trans-contextual model*

The trans-contextual model is a multi-theory approach to understanding the processes by which forms of motivation toward educational activities in an educational context lead to motivation toward similar activities and behaviours outside school in extramural contexts. The model draws its hypotheses from three theories: self-determination theory (Deci & Ryan, 1985, 2000), the theory of planned behaviour (Ajzen, 1985, 1991), and Vallerand's (1997, 2000; 2007) hierarchical model of intrinsic and extrinsic motivation. The model has several important corollaries that form the basis of a series of testable hypotheses that make up the model. Next, I outline these corollaries, their meaning for understanding the model, and identify the key hypotheses relating to each.

2.2.1 Corollary 1. Perceptions of support for self-determined motivation affect self-determined motivation in educational contexts

The trans-contextual model draws heavily from self-determination theory as a leading explanatory system for the effects of motivation on behaviour (Deci & Ryan, 1985, 2000). Self-determined or autonomous forms of motivation are the focus of the theory and are purported to be desirable because they lead to persistence on behaviours and activities in the absence of external reinforcement or contingency and lead to concomitant adaptive outcomes. According to the theory, social agents like teachers can promote self-determined motivation toward students' activities in the educational settings, like physical education, through contingencies and structuring the environment accordingly. For example, research has revealed that teachers are able to foster higher levels of self-determined motivation and greater behavioural persistence by providing feedback that focuses on self-directed learning and by giving students choice over, and a rationale for, their actions (Deci, Spiegel, Ryan, Koestner, & Kauffman,

1982; Reeve, Bolt, & Cai, 1999). The links between autonomy support, and the extent to which students perceive social agents in educational settings support their autonomy, and self-determined motivation has received considerable empirical support (Deci et al., 1991; Reeve, 2002).

School students' perceptions of the extent to which their teacher in an educational setting supports their autonomy and their associated levels of autonomous motivation forms the first corollary of the trans-contextual model. The extent to which students perceive their teachers to provide support for their self-determined motivation is proposed to be associated with levels of self-determined motivation. Such perceptions illustrate the key role that the teacher and educational environment has to fostering autonomous self-directed learning. This aspect of the model has received considerable empirical support in educational contexts (Deci et al., 1991; Reeve, 2002). There is also evidence indicating that perceived autonomy support by students toward teachers correlates strongly with the level of actual autonomy support offered by teachers in educational contexts (Taylor & Ntoumanis, 2007). This suggests that promoting increased autonomy supportive behaviours by teachers may foster increased self-determined motivation in students and illustrates one of the key means by which interventions in educational contexts like school physical education may foster motivation in students.

2.2.2 Corollary 2. Self-determined motivation toward activities in an educational context predicts self-determined motivation toward similar activities in an extramural context

Central to the trans-contextual model is the corollary that self-determined motivation in educational contexts is related to self-determined motivation toward related educational activities in out-of-school contexts. This corollary is based on hypotheses from Vallerand's (1997, 2000; 2007) hierarchical model of intrinsic and extrinsic motivation which states in interplay between self-determined forms of motivation across different settings at the contextual level. The likely mechanism for this is that the adaptive outcomes derived from self-determined activity in one context leads to an increased propensity to experience autonomy toward similar behaviours irrespective of the context. This is because individuals are likely to have a 'stored' schema or script lining the activities, the motivation and associated outcomes in memory which becomes a template for motivation toward similar activities. Therefore, the student may actively seek to engage in further opportunities to engage in activities likely to foster self-determined motivation in the educational context, and the concomitant outcomes such as feelings of satisfaction and enjoyment, outside of school. This is consistent with Basic Needs Theory, the sub-theory of self-determination theory, which suggests that individuals actively seek opportunities for feel autonomous in their actions, competent at the activities they do, and related to social agents and cofactors in their environment (Deci & Ryan, 2000). In seeking out self-determined activities in extramural contexts, students will satisfy these psychological needs and experience the likely concomitant outcomes. The fact that

they have previously experienced need-satisfying behaviours toward educational activities means that seeking out similar activities that satisfy these needs in extramural contexts is more likely. Support for the transfer of self-determined motivation across contexts is relatively scarce. The trans-contextual component is therefore an essential and unique component of the model.

2.2.3 Corollary 3. Self-determined motivation in an extramural context predicts future intention to engage in extramural activities and actual behavioural engagement

A third important corollary of the model proposes that autonomous motivation toward educational activities in extramural contexts will compel an individual to seek out similar behaviours in future. I propose that self-determined motivation will be an important impetus in the decision-making process that leads to future intended behaviour. I have, therefore, employed a leading social-cognitive theory of decision making, the theory of planned behaviour (Ajzen, 1985, 1991), to map the processes by which individuals form intentions to perform activities consistent with their self-determined motives. The theory is a belief-based model in which engaging in a future behaviour is proposed to be a function of intentions, a motivational construct reflecting the extent to which individuals will plan and engage in effort to pursue the behaviour. Intention is proposed to mediate the effect of three sets of beliefs on future behaviour: attitudes which reflect an individual's beliefs that engaging in a future behaviour will lead to desirable outcomes, subjective norms reflecting beliefs that the behaviour is consistent with the perceived desires of significant others, and perceived behavioural control which reflects whether the individual has the capacity and resources to successfully pursue the behaviour.

Within the trans-contextual model, self-determined motivation is proposed to be related to future behaviour through the decision-making process outlined within the theory of planned behaviour. This process is consistent with an original proposal of self-determination theory and the proposed interplay between self-determined motivation at the contextual and situational levels proposed in Vallerand's (2007) model. From a self-determination theory perspective, Deci and Ryan (2000) proposed that self-determined motivation toward a given behaviour or activity will lead to positive attitudes toward the behaviour and intentions to perform the behaviour in the future. The processes that underpin this aspect of the theory were not formally articulated in the original theory and I aimed to address this gap by adopting the theory of planned behaviour within the trans-contextual model. In the trans-contextual model I proposed that the process by which intentions to perform such behaviours are formed and affect future behavioural engagement are represented by the processes outlined in the theory of planned behaviour.

In terms of specific predictions for this aspect of the model, self-determined motivation at the contextual level is proposed to be related to the immediate determinants of intention to perform a specific out-of-school behaviour, namely, attitudes, subjective norms, and perceived behavioural control.

These belief-based variables are proposed to affect intentions to engage in the behaviour in future and actual behavioural engagement. The links between self-determined motivation and the beliefs is derived from the original proposal in self-determination theory that individuals' beliefs toward specific behaviours will likely be consistent with their motivational orientation and they will, therefore, align their motivates with their beliefs. Such an alignment is adaptive as it paves the way for the individual to intend to perform need-satisfying behaviours in the future. The motivational orientation therefore acts as a source of information and drives the pursuit of intentional behaviour consistent with their motives. Consistent with Vallerand's (1997, 2000; 2007) hierarchical model, the intended behaviours likely represent those actions that are likely to be self-determined in future. As such behaviours are specific, a number of decision making processes may be derived from a single contextual-level motive, so individuals may hold positive attitudes, subjective norms, and perceptions of control toward a number of related behaviours consistent with the contextual level motivation.

It is important to note that the sets of beliefs proposed to be antecedent to intentions toward specific behaviours within the theory of planned behaviour align closely with the basic psychological needs within self-determination theory, the satisfaction of which motivates continued pursuit of self-determined activities (Ryan & Deci, 2000). Attitudes reflect beliefs that the behaviour will lead to desirable outcomes and is consistent with the motivation to satisfy the need for autonomy; subjective norms reflect beliefs that the behaviour will be consistent with the desires of significant others and is consistent the motivation to satisfy the need for relatedness; perceived behavioural control reflects beliefs regarding capacity and ability to successfully perform the behaviour and is consistent with motivation to satisfy the need for competence. These close conceptual relations suggest that if an individual perceives actions in a particular context has potential to satisfy psychological needs he or she will be motivated to form beliefs consistent with the needs as antecedents of future need-satisfying action. The satisfaction of all three needs has been consistently shown to be related to self-determined motivation and the self-determined motivation construct in the trans-contextual model reflects the need satisfying behaviour and is therefore expected to be related to three belief-based antecedents of intention in the theory of planned behaviour (Hagger et al., 2006a; Hagger, Chatzisarantis, & Harris, 2006b).

2.2.4 Dual-systems theories

Motivational and social cognitive models of health behaviour such as self-determination theory and the theory of planned behaviour, respectively, focus predominately on factors and processes that are deliberative; behaviour is viewed as the result of conscious, considered decision-making. Such models draw from the assumption that individuals are information processors or base their behaviour on organismic needs that drive motivation. As these theories form the basis of the trans-contextual model, those assumptions also hold for

that model. The trans-contextual model, therefore, should be viewed as one that focuses on conscious, deliberative antecedents of physical activity behaviour. Alternative models that have focused on the more automatic, non-conscious factors that impact behaviour have received considerable recent attention in the motivational literature and the literature on health behaviour. Such models suggest that behaviour is not merely a function of deliberation and conscious decision making, but more spontaneous processes that occur beyond the awareness of the individual (Fazio, 2001; Hofmann, Friese, & Wiers, 2008; Strack & Deutsch, 2004). This presents an issue for the proposed trans-contextual model, and other integrated models of behaviour, as it exclusively focuses on the conscious facts that determine behaviour at the expense of the automatic, non-conscious processes. Such an omission may place limits or boundary conditions on the potential of the integrated model to provide a complete explanation of variance in health-related behaviour, such as leisure-time physical activity. In this section, I will outline some potential alternatives and solutions to the exclusive focus on deliberative factors in such models. I will outline how dual-systems models indicate that two pathways to behaviour exist. I will suggest that future updates or advances on the trans-contextual model should consider an account for the more automatic, non-conscious predictors of behaviour. The automatic processes could be integrated into the updated models using dual-systems models as a template. My intention is to use this as a stepping stone to the development of a comprehensive, integrated model of physical activity and health behaviour, which will account for both conscious and non-conscious pathways to action.

Strack and Deutsch's (2004) Reflective-Impulsive Model (RIM) draws together research on deliberative, conscious (reflective) predictors and spontaneous, non-conscious (impulsive) predictors of action into one single theoretical framework. The model encompasses the strengths of previous theories and models, such as Fazio and Towles-Schwen's (1999) Motivation and Opportunity as Determinants (MODE) model, to provide a more complete account. In the RIM, the reflective system proposes that behaviour is the result of explicit decisional processes, based on consideration of knowledge, facts and values; this process relies on higher-order, control resources. This is consistent with the motivational and social-cognitive theories on which integrated models like the trans-contextual model are based. The impulsive system, on the other hand, conceptualizes behaviour as a function of reflective or perceptual input that activates stored behavioural patterns of action or schema underpinned by associative networks and spreading activation (see Back, Schmulke, & Egloff, 2009). The schema drive behavioural responses that are implicit and not guided by conscious control or deliberative input. The RIM provides a parsimonious account of both impulsive/implicit and reflective/explicit processes (Hofmann, Friese, & Strack, 2009; Hofmann et al., 2008).

Conceptually, the RIM can form the basis of an integrated model in which conscious, deliberative, and reflective constructs that drive behaviour in motivational and social-cognitive models are integrated alongside more implicit,

non-conscious, and impulsive determinants. In such a model, implicit and explicit forms of motivation (such as the motivational orientations from self-determination theory) are purported to have independent pathways to behaviour. The explicit system is conceptualized as predicting action via intention as intention is a key component of a reflective route to action. Intention is expected to mediate the impact of explicit motivational constructs (e.g., autonomous and controlled forms of motivation from self-determination theory). This is unlikely to be the same for the impulsive motivational constructs which are proposed to affect behaviour directly independent of intentions. The dual-systems approach implies that behaviours may be determined as a function of the two routes and the extent to which each route impacts behaviour and, therefore, the relative contribution of implicit and explicit motivational constructs in the model will be determined by the behaviour and by the context. For example, behaviours that are complex or novel are likely to require considerable planning and will be better predicted by constructs tapping into the reflective system. In contrast, simple behaviours or those that have been engaged in frequently in the past are likely to be more subject to constructs tapping into the impulsive system. The important issue, therefore, is not whether there are reflective or impulsive aspects to a particular behaviour, but, rather, the extent to which each of the two systems, reflective or impulsive, drive the behaviour.

The reason why impulsive non-conscious factors have received considerable recent attention in the literature is through the recognition that many actions tend to be impulsive and spontaneous (Calitri, Lowe, Eves, & Bennett, 2009; Eves, Scott, Hoppe, & French, 2007; Gardner, 2014). For example, many behaviours are the result of learned or conditioned cue-response pairings, which determine action in the absence of any active, deliberative, and conscious intervention to avert the ingrained behavioural pattern or schema (Gardner, 2014). However, knowing that a behaviour is highly reliant on impulsive, non-conscious input may seem somewhat reductionist from a theoretical perspective, and redundant from an intervention perspective, given that such processes are unlikely to respond to persuasive communication or other behaviour-change techniques. This is because many behaviour-change techniques impact behaviour by manipulating mediating variables purported to be part of reflective pathways such as attitudes and self-efficacy (Hagger, 2010; Schwarzer, 2008b). However, knowledge of the extent to which impulsive factors impact on behaviour may provide those interested in interventions with information that interventions focusing on deliberative processing may be ineffective because the behaviour is largely controlled by more implicit, impulsive processes. This may, therefore, point to the need to change behaviour by using means independent of deliberative decision-making and persuasion, such as shaping the environment or introducing policies that interrupt well-learned patterns of action. These could be pricing policies or policies that prohibit the behaviour in question. Recent examples are pricing policies for alcohol consumption (Lonsdale, Hardcastle, & Hagger, 2012) or bans on tobacco smoking in public places (Evans et al., 2001). This provides a clear rationale for the development of inte-

grated models that incorporate the dual-systems approach to account for both the deliberative predictors of behaviour, such as those proposed in motivational and social-cognitive theories, and spontaneous predictors of health behaviour.

3 PURPOSE OF THE RESEARCH AND HYPOTHESES

The purpose of the series of studies in the current thesis is to test the proposed multi-theory trans-contextual model charting the process by which self-determined motivation leads to future intended behaviour. The thesis also aims to summarise the literature on the model, resolve some of the critiques of the model, and demonstrate its efficacy as part of a generalised integrated behaviour-change model. A series of quantitative studies will test the tenets of the proposed model using a three-wave prospective (longitudinal) correlational design. The approach will make important assumptions from quantitative psychology, psychometrics, and social cognition, in that individuals process information in a logical consistent manner and make decisions based on available social information (Hagger & Chatzisarantis, 2009a). In the studies I propose to administer measures of the constructs from self-determination theory and the theory of planned behaviour to provide support for the 'motivational sequence' proposed in the integration of the two theories in the trans-contextual model and the tenets of the third theory, Vallerand's (1997, 2000; 2007) hierarchical model of intrinsic and extrinsic motivation. Acceptance of the model as a reasonable explanatory system for the transfer of autonomous motivation from a PE context into autonomous motivation, intentions, and actual behaviour with respect to physical activity in a leisure-time, out-of-school context will be garnered if the three main corollaries outlined in the background section are supported in the tests.

I will test the corollaries and associated hypotheses in an initial study (Study 1) adopting the three wave prospective correlational design in a sample of school children aged 13-16 years from the United Kingdom (UK). In addition, I propose that the tenets of the model will be universal across cultures, consistent with proposals of the theory of planned behaviour and self-determination theory, that the processes outlined are universal and applicable to all cultures. I propose to test the hypotheses of the trans-contextual model in multiple samples from different national samples of school children of approximately the same age with different cultural backgrounds (samples will be drawn from Greece, Poland, Singapore, and the UK) using the same design as

the initial development study (Study 2). In addition, it is expected that the effects of perceived support by social agents for self-determination in the education context, namely, the PE teacher, on children's autonomous motivation toward physical activity in a PE context, and in an out-of-school context, will be independent of the effects of perceived support by other sources of support for self-determination in leisure-time physical activity, namely parents and peers. This will be tested in a third prospective study (Study 3) in which perceived autonomy support from peers and parents will be included in the model and the effects of perceived autonomy support from PE teachers tested alongside the effects of autonomy support from these additional sources. This model will also be tested for universality of the hypothesised relationships between the constructs in the proposed motivational sequence in samples of school children from four European nations: Estonia, Finland, Hungary, and the UK.

The subsequent three studies are reviews that will collectively draw together the results of Studies 1-3, and those of other studies adopting the trans-contextual model, test the model across multiple studies adopting the model, and develop a more comprehensive model of behaviour change based on the theoretical integration proposed in the trans-contextual model. In the first instance, a conceptual review (Study 4) will outline the main hypotheses and summarise the research to date. The review is expected to provide initial indication of consistency in model effects across the literature. This is extended in the subsequent conceptual review and accompanying meta-analysis (Study 5). In the review, some critiques of the model, including its capacity to be falsified, the role of beliefs from the theory of planned behaviour, and the proposals for causality will be directly addressed. In addition, a quantitative synthesis of evidence will be conducted of all studies adopting the model in physical activity behaviour to further confirm the proposed effects across the literature and to provide converging evidence in support of its corollaries and accompanying hypotheses. The final review (Study 6) concerns itself with investigating how the theoretical integration proposed in the trans-contextual model can serve as a starting point for a more comprehensive theory of action. The proposed integrated behaviour-change theory will incorporate volitional post-intentional processes and implicit non-conscious processes from dual-process and dual-systems theories and demonstrate how hypotheses from these different perspectives can serve to delineate parallel or alternative processes that lead to action other than the explicit, deliberative motivational sequence offered in the trans-contextual model.

The corollaries of the trans-contextual model themselves comprise a series of specific hypotheses, which I outline below in a step-by-step fashion with specific reference to the literature underpinning the hypotheses. The proposed motivational sequence from the integrated model is illustrated in Figure 1, and I will make reference to the diagram in outlining the specific hypotheses. These hypotheses are explicitly tested in the empirical studies in this thesis (Studies 1-3) and in the meta-analysis of tests of the model (Study 5).

3.1 Hypotheses linked to Corollary 1

A single hypothesis relating to this corollary is concerned with the important link between significant social agents in the educational environment, in this case PE teachers, and their perceived effect on the motivation of children toward activities in the educational context, in this case PE lessons. The first hypothesis of the model, therefore, is that school students' perception of the motivational climate in PE as being autonomy supportive is hypothesised (H_1) to enhance their autonomous motivation in a PE context (see Figure 1, path 1).

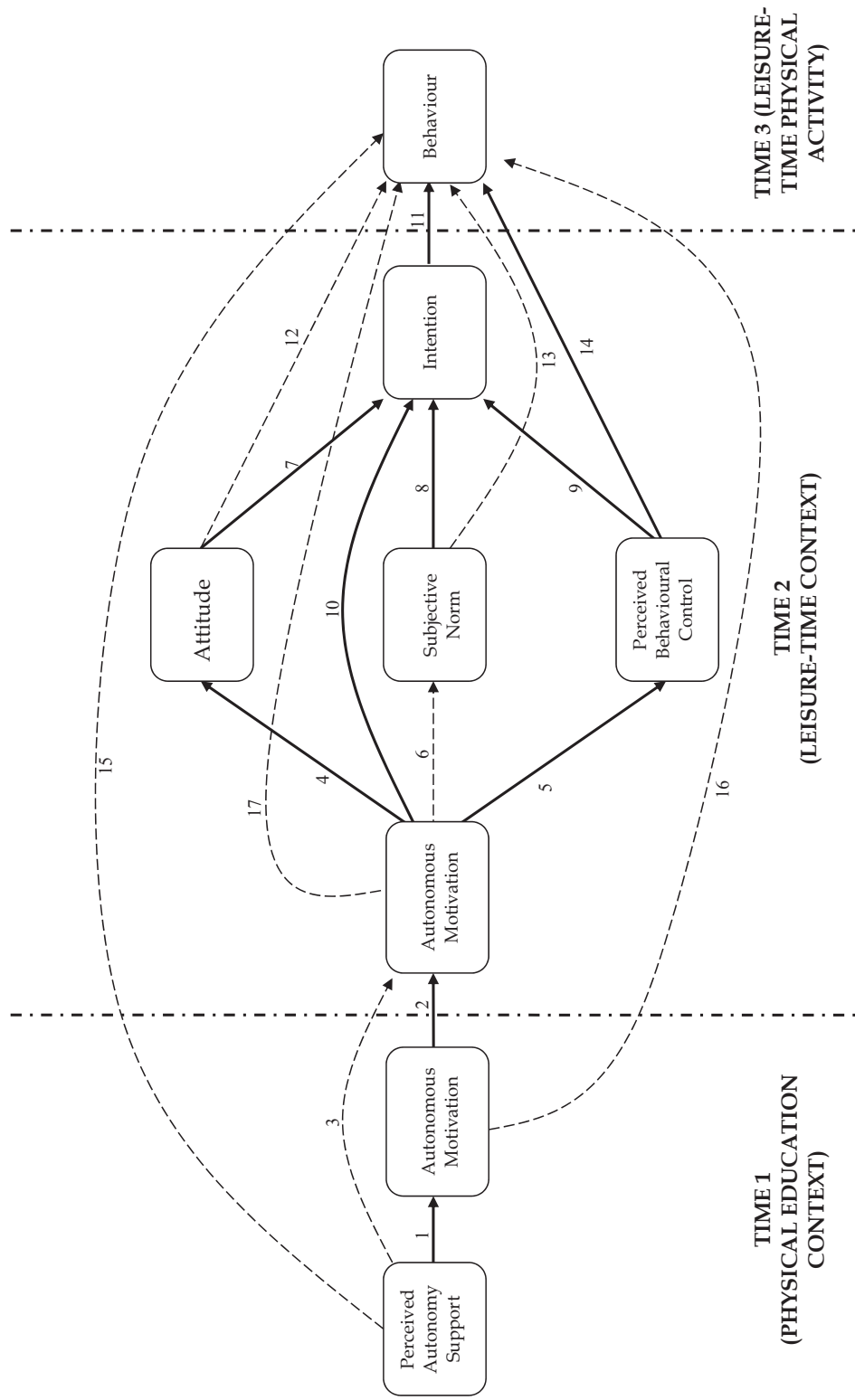
3.2 Hypotheses linked to Corollary 2

Corollary 2 refers to the transfer of motivation between educational (PE) and out-of-school (leisure time) contexts. Two hypotheses relate to this corollary. The hypotheses rely on support for the hypothesised link between perceived autonomy support and autonomous motivation in PE in Corollary 1 and is based on Vallerand's (1997; 2002) suggestion that interplay between motivational constructs occurs at the contextual level, such that autonomous motivation in one context, like school PE, can affect autonomous motivation in another, such as leisure-time. It is hypothesised (H_2) that autonomous motivation in a PE context will be related to autonomous motivation toward physical activity in a leisure-time context (see Figure 1, path 2). It is also expected that autonomous motivation in a PE context will completely mediate the relationship between perceived autonomy support in a PE context and autonomous motivation toward physical activity in a leisure-time context (H_3). Autonomous motivation in PE is therefore the conduit through which perceived autonomy support affects motivation in another related context and is implicated in the trans-contextual effect. Therefore the direct path linking perceived autonomy support in a PE context with autonomous motivation toward physical activity in a leisure-time context will be non-significant (indicated by dotted path 3 in Figure 1).

3.3 Hypotheses linked to Corollary 3

In congruence with Vallerand's (1997) predictions, and with the findings of studies examining the impact of autonomous motivation from self-determination theory on intentions and behaviour within the theory of planned behaviour (e.g., Chatzisarantis et al., 2002; Hagger, Chatzisarantis, & Biddle, 2002a), it is hypothesised that autonomous motivation in a leisure-time context will be related to physical activity intentions and behaviour only via the mediation of the belief-based constructs of attitude, subjective norms and perceived

FIGURE 1 Hypothesised relationships in the trans-contextual model



behavioural control from the theory of planned behaviour. Specifically, it is anticipated that autonomous motivation toward physical activity in leisure time will be significantly and positively related to attitudes (H_4) and perceived behavioural control (H_5). This is illustrated by paths 4 and 5 in Figure 1. Since subjective norms typically reflect social pressure or demands from significant others to engage in the target behaviour, and is therefore more congruent with non-autonomous, controlling forms of motivation from self-determination theory, autonomous motivation is not expected to be related to subjective norms (H_6). This is illustrated by broken path 6 from autonomous motivation in leisure time to subjective norms in Figure 1. Attitudes (H_7), subjective norms (H_8), and perceived behavioural control (H_9) will significantly predict intentions, consistent with the theory of planned behaviour, as illustrated by paths 7, 8, and 9, respectively, in Figure 1. In addition, attitudes (H_{10}) and perceived behavioural control (H_{11}) will completely mediate the relationship between autonomous motivation in leisure time and intentions to participate in leisure-time physical activity. This is because autonomous motivation is presumed to act as a source of information in the formation of attitudes and perceived behavioural control (Chatzisarantis et al., 2002) and compels individuals to form attitudes and perceptions of control consistent with their overarching contextual motives toward physical activity. In order to achieve this mediation, it is expected that autonomous motivation will be significantly correlated, in terms of zero-order, unattenuated correlation, with intentions, consistent with previous research (e.g., Wilson & Rodgers, 2004). Subjective norms will not mediate the effect of autonomous motivation in leisure time on intentions as the autonomous motivation-subjective norm effect is proposed to be zero (H_{12}). In Figure 1, the direct path from autonomous motivation to intention is proposed to be substantially attenuated, but perhaps not completely extinguished, due to the indirect effects through attitude and perceived behavioural control (H_{13}). This is illustrated by the solid direct link between autonomous motivation and intention, path 10, in Figure 1.

The final link in this proposed sequence is the hypothesis (H_{14}) that intentions will predict behaviour and will mediate the impact of attitudes (H_{15}), subjective norms (H_{16}), and perceived behavioural control (H_{17}) on physical activity behaviour, as originally proposed in the theory of planned behaviour (Ajzen, 1985). In Figure 1, the intention-behaviour relationship is illustrated path 11. The mediation of the effects of attitudes, subjective norms and perceived behavioural control on physical activity behaviour is illustrated by lines 12, 13, and 14 from these variables to behaviour and, as they are expected to be non-significant, the lines are dotted. The one exception is the proposed direct effect of perceived behavioural control on physical activity behaviour in addition to the indirect effect via intentions (Ajzen & Madden, 1986), illustrated in Figure 1 by the fact that path 14 is represented by a solid line (H_{18}). Overall, I also expect perceived autonomy support (H_{19} - intention; H_{20} - behaviour) and autonomous motivation (H_{21} - intention; H_{22} - behaviour) in PE to have a significant overall effect (also known as a 'total indirect effect'), via the motivational se-

quence illustrated in the model, on physical activity intentions and behaviour in leisure time and also for autonomous motivation in a leisure-time context on physical activity behaviour, mediated by the set of belief-based constructs of attitudes, subjective norms and perceived behavioural control, and intentions (H_{23}). These overall effects are considered to be indirect and this means that the direct effects of these constructs, illustrated by dotted paths 15, 16, and 17, respectively, in Figure 1, should be non-significant.

Finally, a considerable body of research has examined the impact of past behaviour in the theory of planned behaviour. These studies have emphasised that past behaviour-future behaviour links reflect the covariance stability of the behaviour or decision-making processes that have been conducted in the past (Ajzen, 2002; Sutton, 1994). However, to the extent that the past behaviour-future behaviour relationship is attenuated by the introduction of explanatory social cognitive or motivational variables (such as those from self-determination theory or the theory of planned behaviour proposed in the current integrated trans-contextual model), one can be confident that these variables account for such stability (Ajzen, 2002; Bagozzi, 1981; Bagozzi & Kimmel, 1995; Bentler & Speckart, 1981), and this has important implications for intervention and behaviour change because, if such variables did not account for past behaviour, then the impact of any interventions based on the psychological models would be minimal. It is therefore proposed that while past leisure-time physical activity behaviour may have an impact on future leisure-time physical activity behaviour, the proposed relations variables from the trans-contextual model will hold. I plan to include past behaviour, therefore, as control variable in tests of the trans-contextual model. This means including past physical activity behaviour as a predictor of all of the variables in the model and, to the extent that the proposed relationships in the model hold after the inclusion of past behaviour, I will have sharp confirmation that the psychological variables account for, at least in part, the relation between past behaviour and future behaviour.

3.4 Additional research questions and hypotheses

In addition to the formal hypotheses from the trans-contextual model, I also expect the pattern of effects to be supported through the narrative review (Study 4) and meta-analysis (Study 5) of studies testing the effect. Specifically, all three corollaries and accompanying hypotheses are expected to be supported in a path analytic test of the model derived from a meta-analytic synthesis of research on the trans-contextual model. The development of the integrated behaviour-change model (Study 6) will use the theoretical integration as the starting point. It will provide the basis for integrating volitional and implicit processes into the integrated motivational sequence based on self-determination theory and the theory of planned behaviour. I will develop a series of testable hypotheses regarding the effects of volitional components (e.g., planning and implicit processes (e.g., implicit motivation) on health-related behaviour (e.g.,

Hagger & Luszczynska, 2014; Keatley, Clarke, & Hagger, 2012). Planning will be expected to be a moderator of the intention-behaviour 'gap' and implicit processes an independent parallel predictor of actual behaviour alongside intentions and autonomous motivation in the trans-contextual model. These hypotheses will not be tested empirically in the current theses, but will form the basis of future recommendations for research.

3.5 Overview of thesis

The Methods section will outline the methods used to test these hypotheses starting with an initial test in a sample of school children (Study 1) and then progressing to tests of validity across multiple samples, including cross-cultural validity (Studies 2 and 3), and a test that includes additional variables including perceived autonomy support from other sources (parents and teachers) with the aim of broadening the predictions of the model (Study 3). The narrative review (Study 4) aims to bring together the research using integrated models of the theory theories that make up the trans-contextual model and evaluate the contribution the model makes to the understanding the predictors of motivation in education, particularly PE, on behaviour, particularly physical activity behaviour, outside of school. The subsequent empirical review (Study 5), extends Study 4 by addressing the limitations and critiques of the trans-contextual model and aims to verify the pattern of effects by subjecting all tests of the model, from the current study and from previous research, to a meta-analytic synthesis to ascertain the pattern of effects in the model correcting for sampling and measurement error. The final study (Study 6) reports the development of a generalised integrated model incorporating hypotheses from the component theories of the trans-contextual model alongside motivational and volitional phases of behavioural engagement and automatic and implicit processes. The model is based on an integration of the planned behaviour and self-determination theories with dual-process and dual-systems theories that incorporate different routes to behaviour, intentional and non-intentional.

3.6 Summary of main aims

There are five main aims of the current thesis, they are summarised here along with the specific hypotheses relating to each. The hypotheses are outlined in Table 1 with the accompanying corollaries.

(1) To test the hypotheses of the trans-contextual model (summarised in Table 1) and its universality in multiple samples from different cultural groups (Studies I and II);

(2) To test the extended trans-contextual model and its universality in multiple samples from different cultural groups (Study III);

(3) To review the main hypotheses of the trans-contextual model and identify conceptual problems and offer solutions (Study IV) to three key contentious issues: the falsifiability of the theory, the role of beliefs, and the inference of causality;

(4) To integrate the findings of the trans-contextual model and test study hypotheses based on the synthesis (Study V);

(5) To use the trans-contextual model and other theories as a basis to develop a comprehensive integrated model of physical activity behaviour (Study VI).

TABLE 1 Fundamental hypotheses of the Trans-Contextual Model

Hypothesis	Corollary	Prediction
H ₁ . Perceived autonomy support (PE context)→Autonomous Motivation (PE context)	1	Effect
H ₂ . Autonomous Motivation (PE context)→Autonomous Motivation (leisure time context)	2	Effect
H ₃ . Perceived autonomy support (PE context)→Autonomous Motivation (PE context)→Autonomous Motivation (leisure time context)	2	Effect
H ₄ . Autonomous Motivation (leisure time context)→Attitude	3	Effect
H ₅ . Autonomous Motivation (leisure time context)→PBC	3	Effect
H ₆ . Autonomous Motivation (leisure time context)→Subjective Norm	3	No Effect
H ₇ . Attitude→Intention	3	Effect
H ₈ . Subjective Norm→Intention	3	Effect
H ₉ . PBC→Intention	3	Effect
H ₁₀ . Autonomous Motivation (leisure time context)→Attitude→Intention	3	Effect
H ₁₁ . Autonomous Motivation (leisure time context)→PBC→Intention	3	Effect
H ₁₂ . Autonomous Motivation (leisure time context)→Subjective Norm→Intention	3	No Effect
H ₁₃ . Autonomous Motivation (leisure time context)→Intention ^b	3	Effect
H ₁₄ . Intention→Behaviour	3	Effect
H ₁₅ . Attitude→Intention→Behaviour	3	Effect
H ₁₆ . Subjective Norm→Intention→Behaviour	3	Effect
H ₁₇ . PBC→Intention→Behaviour	3	Effect
H ₁₈ . PBC→Behaviour	3	Effect
H ₁₉ . Perceived autonomy support→Intention ^c	3	Effect
H ₂₀ . Perceived autonomy support→Behaviour ^c	3	Effect
H ₂₁ . Autonomous Motivation (PE context)→Intention ^d	3	Effect
H ₂₂ . Autonomous Motivation (PE context)→Behaviour ^d	3	Effect
H ₂₃ . Autonomous Motivation (leisure time context)→Behaviour ^b	3	Effect

4 METHODS

4.1 Study designs

Studies 1-3 of the current thesis adopted a unique three-wave prospective correlational design. In this design, self-reported measures of psychological constructs from the three component theories of the trans-contextual model are collected at an initial point in time, a second point in time one-week later, and behavioural measures at a third point in time five weeks after the initial data collection. Studies 4 and 5 were conceptual and empirical reviews that aimed to summarise the key hypotheses of the trans-contextual model and synthesise the research adopting the model from the current thesis and by other researchers. Study 6 broadened and deepened the themes from the model to develop a more comprehensive model of physical activity behaviour, based on the integration of the theory of planned behaviour and self-determination theory, as well as contemporary frameworks for implicit and automatic antecedents of behaviour, including dual-process models and dual-systems theory. The specific designs of each study are outlined below.

4.1.1 Study 1

This study set a precedent for all empirical studies in the thesis, and by subsequent researchers, by testing the trans-contextual model using the three-wave prospective correlational design. High-school students ($N = 295$, girls = 163, boys = 132, Age = 14.50, $SD = 1.35$) completed measures of perceived autonomy support and measures of different types of motivational regulations from self-determination theory in a PE context at an initial wave of data collection. One week later, participants' completed measures of motivational regulations from self-determination theory and measures of attitudes, subjective norms, perceived behavioural control, and intentions from the theory of planned behaviour with respect to engaging in physical activity in a leisure-time context. The one-week time gap was included in order to minimise common method vari-

ance because the self-determination theory measures are approximately the same. Participants' leisure-time physical activity behaviour was measured at a third data collection occasion, five weeks later.

4.1.2 Study 2

Study 2 tested the trans-contextual model in samples of high-school pupils from four national groups with different cultural backgrounds, namely, the United Kingdom (N = 222, 118 girls, 104 boys; *M* age = 14.68, *SD* = 1.47), Greece (N = 93, 57 girls, 36 boys; *M* age = 13.99, *SD* = .80), Poland (N = 103, 56 girls, 47 boys; *M* age = 16.28, *SD* = 1.12), and Singapore (N = 133, 67 girls, 66 boys; *M* age = 13.32, *SD* = .47). Participants completed measures of perceived autonomy support and autonomous motivation in a PE context at an initial data collection occasions. One week later, participants' completed measures of autonomous motivation and constructs from the theory of planned behaviour in a leisure-time physical activity context. Five weeks later participants self-reported reported their physical activity behaviour. The measures used were identical to those used in Study 1. Measures were translated into the native languages of the samples from the Greek, Polish, and Singaporean national groups using gold standard back-translation techniques and expert bi-lingual interpreters.

4.1.3 Study 3

High-school pupils from the United Kingdom (N = 210, boys = 94, girls = 116; *M* age = 13.19, *SD* = 1.12), Estonia (N = 268, boys = 117, girls = 151; *M* age = 15.04, *SD* = 0.91), Finland (N = 127, boys = 55, girls = 72; *M* age = 14.30, *SD* = 0.49), and Hungary (N = 235, boys = 114, girls = 121; *M* age = 14.02, *SD* = 0.99) completed measures of perceived autonomy support from PE teachers, autonomous motivation in both contexts, attitudes, subjective norms, perceived behavioural control, and intentions from the theory of planned behaviour, and measures of behaviour and past behaviour in a leisure-time context. In addition, the unique contribution of this study was that it incorporated perceived autonomy support from other out-of-school sources likely to promote autonomous motivation toward leisure-time physical activity: peers and parents. We therefore included an additional measure administered at the second time point of the three-wave prospective designed study designed to tap perceived autonomy support from peers and parents.

4.1.4 Study 4

Study 4 was a conceptual and narrative review and aimed to evaluate the contribution of the trans-contextual model to understanding the transfer of autonomous motivation from an educational context (e.g., PE) to a leisure-time context (e.g., leisure-time physical activity). The decision to conduct a conceptual, narrative approach to the review was for two reasons. The first because research on the trans-contextual model is a very focused literature negating the

need for a comprehensive 'systematic' database search as all of the studies purporting to adopt the model were readily identifiable and accessible. As the literature increases and the model is more widely used, a systematic review may be more appropriate, in fact the meta-analysis conducted in Study 5 is a logical extension of the current review. Second, the focus is on conceptual and theoretical issues relating to the model and to take the premises of the model that has been largely conducted in the physical education and leisure-time physical activity context in to an education context. The article arising from this review was for a Special Issue on motivational transfer in education, and the narrative approach was deemed most appropriate by the special issue editors. I conducted a literature search using various electronic databases to identify key articles testing the trans-contextual model as well as reference lists of pertinent journals and personal contact with trans-contextual model authors. This formed the basis of the review which aimed to ascertain the extent of support for the trans-contextual model hypotheses across the literature.

4.1.5 Study 5

Study 5 was a conceptual review of the hypotheses and theoretical basis of the trans-contextual model as well as a meta-analysis of the trans-contextual model. The review that focused on testing the model corollaries and hypotheses by quantitatively synthesising the research from the current thesis, and by other researchers using meta-analytic techniques. The review also aimed to clarify the hypotheses and corollaries of the model as well as addressing some of the conceptual bases of the model and the critiques that have been levelled at the model. Specifically, I address whether the model can be rejected and what constitutes a 'null' or 'failed' replication of the model, whether the inclusion of the beliefs from the theory of planned behaviour is necessary to understand model effects, and whether the proposed ordering of the constructs in the model is justified against other alternatives.

4.1.6 Study 6

The purpose of Study 6 was to broaden and deepen the processes leading to health-related behaviour, particularly physical activity (although the hypotheses are expected to extend to other health behaviours), by integrating the component theories of the trans-contextual model along with those from dual-process models and dual-systems theories of behaviour. Dual-process models include Action-Control theory (Heckhausen & Gollwitzer, 1987), I-change model (de Vries, Mesters, van de Steeg, & Honing, 2005), Health Action Process Approach (HAPA; Schwarzer, Lippke, & Ziegelmann, 2008), and MoVo concept (Fuchs, Goehner, & Seelig, 2011). These models outline the motivational and volitional processes leading up to behavioural enactment. Dual-systems theories such as the Reflexive-Impulsive Model (RIM; Strack & Deutsch, 2004) outline the effects of intentional (reflective) and non-intentional (impulsive) routes to behaviour. The study adopted a narrative review design, drawing from re-

cent conceptual and theoretical articles outlining on these theories, and the principles of theoretical integration were utilised to propose hypotheses with respect to the multiple processes that lead to health behaviour.

4.2 Participants (Studies 1-3)

Participants for all three empirical studies (Studies 1-3) were school pupils aged 12 to 15 years sourced from secondary schools in the UK (Study 1), Greece, Poland, Singapore, and the UK (Study 2), and Estonia, Finland, Hungary and the UK (Study 3).

4.3 Source data (Studies 4-6)

The source data for the narrative (Study 4) and conceptual review (Study 6) was the published literature on the trans-contextual model and integrated theoretical models of health behaviour, respectively. The source data for the empirical review (Study 5) was the published and unpublished literature on tests of the trans-contextual model. Inclusion criteria for the empirical model included at least one test of the trans-contextual effect and adoption of both self-determination theory and the theory of planned behaviour constructs. Studies did not have to include tests of all model hypotheses.

4.4 Ethics

The highest standards of participant welfare were followed in the course of the empirical studies in this thesis (Studies 1-3). Ethical approval was obtained from the Ethical Review Boards at the host institutions from which Study 1 (University of Essex, UK), Study 2 (University of Essex, UK; Aristotle University of Thessaloniki, Greece; Nanyang Technological University, Singapore; Academy of Physical Education, Poland), and Study 3 (University of Essex, UK; University of Tartu, Estonia; University of Pécs, Hungary) were conducted. Parental consent from all participants was secured prior to data collection. Participants were fully informed of the purpose and requirements of the study in advance of their participation, the expectations of the researchers, and their rights to withdraw from the study. Participants were informed that they would be guaranteed complete anonymity, that the data gained in the course of the study will be used exclusively for research purposes, and that their name will not be used at any time during the course of the study and in any subsequent publication. Participants were given opportunity to ask questions prior to their participation and were required to complete a consent form.

4.5 Measures

We used standardized psychometric measures typically used to tap constructs from the component theories of the trans-contextual model. These measures were consistent across Studies 1-3 for the core constructs in the model, namely, perceived autonomy support and perceived locus of causality (autonomous motivation) from self-determination theory in PE context (Mullan, Markland, & Ingledew, 1997; Ryan & Connell, 1989), perceived locus of causality (autonomous motivation; Ryan & Connell, 1989) and intentions, attitudes, subjective norms, and perceived behavioural control from the theory of planned behaviour (Ajzen, 2003b). Behaviour and past behaviour were measured from validated self-report measures based on those previously used for reporting physical activity behaviour in young people (Godin & Shephard, 1985; Hagger, Chatzisarantis, & Biddle, 2001; Hagger, Chatzisarantis, Biddle, & Orbell, 2001). The measures are outlined in full in the next sections. Measures adopted in Studies 1-3 were identical with the exception that the instruments for studies 2 and 3 were translated into the native language of the participants. Additional measures of perceived autonomy support for leisure-time physical activity from peers and parents in Study 3 were also exclusive to that study and based on the health care climate questionnaire (Williams, Cox, Kouides, & Deci, 1999).

4.5.1 Perceived autonomy support

The measure of students' perceived autonomy support from physical education teachers was developed from perceived autonomy support measures that have shown construct, discriminant, predictive, and nomological validity with other like constructs (Hagger et al., 2003; G. C. Williams, 2002). An example item from the scale is: "I feel that my teacher provides me with choices, options, and opportunities to do active sports and/or vigorous exercise". Responses were recorded on seven-point scales ranging from 1 ("strongly disagree") to 7 ("strongly agree"). In Study 3, we included an additional measure administered at the second time point of the three-wave prospective design to tap perceived autonomy support from peers and parents. This measure, known as the Perceived Autonomy Support Scale for Exercise Settings (PASSES; Hagger, Chatzisarantis, et al., 2007) comprised items identical to those used to measure perceived autonomy support from teachers in physical education context modified only to make reference to different sources (parents or peers) and an out-of-school context. An example item from the scale is: "I feel that my [salient referent(s)] provide(s) me with choices, options, and opportunities to do active sports and/or vigorous exercise" with "friends" or "parents" replacing "PE teacher" as the salient referent in each of the scales. Responses were recorded on seven-point scales ranging from 1 ("strongly disagree") to 7 ("strongly agree").

4.5.2 Autonomous Motivation in PE.

A modified version of Ryan and Connell's (1989) perceived locus of causality scale was used to measure autonomous motivation in PE. The scale measures four types of motivation, each varying in the degree of autonomy on a continuum ranging from high to low autonomy, known as the perceived locus of causality (PLOC). The types of motivation are: *intrinsic motivation* (e.g., "I participate in PE because it is fun"), the prototypical form of autonomous motivation representing behavioural engagement for no external contingency or reinforcement; *identified regulation* (e.g., "I participate in PE because I value PE"), a highly autonomous form of motivation representing motivation to engage in a behaviour because it services goals that are intrinsic and salient to the self; *introjected regulation* (e.g., "because I will feel ashamed if I do not do PE"), a less autonomous form of motivation reflecting behavioural engagement due to perceived internal pressures like avoiding shame or guilt or gaining contingent self-worth or pride; and *external regulation* (e.g., "I participate in PE because important others want me to do PE"), the prototypical form of extrinsic motivation, and therefore the least autonomous, reflecting engaging in behaviours due to external reinforcement such as obtaining a reward or avoiding punishment. Responses were made on four-point scales ranging from 1 ("not true at all") to 4 ("very true").

4.5.3 Autonomous Motivation in Leisure-Time

Mullen and Markland's (1997) Behavioural Regulations in Exercise Questionnaire was used to measure autonomous motivation in a leisure-time context. Participants were asked "Why do you participate in active sports and/or vigorous physical activities in your spare time?" followed by reasons from each motivation style from the PLOC. Items measuring intrinsic motivation (e.g., "I exercise because it is fun"), identified regulation (e.g., "I exercise because it is important to make the effort"), introjected regulation (e.g., "I exercise because I will feel guilty if I do not"), and external regulation (e.g., "I exercise because others say I should") were assessed on seven-point scales ranging from 1 ("not true at all") and 7 ("very true").

4.5.4 Intentions

Items measuring intention (e.g., "I intend to do active sports and/or vigorous physical activities during my leisure time in the next 5 weeks...") were derived from Ajzen's (2003b) recommendations and rated on seven-point scales anchored by 1 ("strongly agree") to 7 ("strongly disagree"). Internal consistency statistics for this scale were satisfactory across the samples ($\alpha = .95; .92; .94; .81$).

4.5.5 Attitudes

Items measuring attitudes were measured using seven-point semantic differential scales with the bipolar adjectives (e.g., *bad-good*, *harmful-beneficial*, *not enjoyable-enjoyable*, *useful-useless*, and *boring-interesting*). The scales were preceded by the common stem: "Participating in active sports and/or vigorous physical activities during my leisure time in the next five weeks is...". The scale was based on Ajzen's (2003b) guidelines.

4.5.6 Subjective norms.

Items tapping subjective norms (e.g., "People important to me think that I should do active sports and/or vigorous physical activities during my leisure time in the next 5 weeks") were based on Ajzen's (2003b) recommendations. Responses were made on seven-point scales with 1 ("strongly disagree") to 7 ("strongly agree") endpoints.

4.5.7 Perceived behavioural control.

The measure of perceived behavioural control (e.g., "I feel in complete control over whether I do active sports and/or vigorous physical activities in my leisure time in the next 5 weeks") was derived from Ajzen's (2003b) recommendations. Responses were given on seven-point scales ranging from 1 ("no control") to 7 ("complete control").

4.5.8 Physical activity behaviour.

Self-reported leisure-time physical activity behaviour was measured at the third and final wave of data collection using an adapted version of Godin and Shepherd's (1985) Leisure-Time Exercise Questionnaire. Participants rated their five-week behavioural frequency on two items (e.g., "In the course of the past two weeks, how often have you participated in vigorous physical activities for 20 minutes at a time?") using six-point Likert scales with scale endpoints *never* (1) and *everyday* (6). A definition of vigorous physical activity was given: "Vigorous physical activities are activities which make your heart beat faster, breathe faster, and hot and sweaty".

4.5.9 Past behaviour

Past physical activity behaviour was assessed at the first wave of data collection on a single-item: "In the course of the past six months, how often, on average, have you participated in vigorous physical activities for 20 minutes at a time?" Responses were made on six-point Likert scales with scale endpoints *not at all* (1) and *most days per week* (6). This measure has been used in many previous studies to estimate past behavioural frequency (Hagger, Chatzisarantis, & Biddle, 2001; Hagger, Chatzisarantis, Biddle, et al., 2001).

4.6 Statistical analyses

In each of the three empirical studies, the proposed hypotheses of the trans-contextual model outlined in Chapter 3 and illustrated in Figure 1 were tested using path analysis via simultaneous method. This was viewed as the most optimal analytic method as although sample sizes of each of the empirical studies will be substantial and will have appropriate statistical power to detect effects, full latent variable models will be unfeasible given the large number of parameters that the measurement aspect of a latent variable approach introduces to the structural equations. The analyses therefore used non-latent manifest variables rather than latent variables. However, the analysis is superior to multiple regression as it enables an a priori pattern of relationships, including direct and indirect (mediated) pathways to be proposed. It also permitted me to compute overall goodness-of-fit statistics. In all cases the analyses were conducted with the EQS structural equations computer software (Bentler, 2004). Preliminary analyses included tests of univariate and multivariate non-normality using Mardia's coefficient which indicated minor departures from normality and, as a consequence, the robust maximum likelihood Satorra-Bentler (1988) scaled approach was used to protect from any deviations from normality adversely affecting estimates. Standard means to evaluate the internal consistency of measures such as Cronbach alpha coefficients and composite reliability were also used. Finally, in Study 1 we also checked the discriminant validity of the components using latent variable approaches which was made possible by doing these analyses separately for similar scales along theoretical lines (e.g., discriminant validity of autonomous motivation in PE and autonomous motivation in physical activity in leisure time context). This was done using a series of discriminant validity and congenetic models (Mulaik & Millsap, 2000). This provided strong evidence to support the use of these variables together in the subsequent path analyses.

Finally, for Study 5, a meta-analysis of tests of the trans-contextual model, a comprehensive search of electronic data bases as well as manual search of journals and articles to identify all published articles reporting key trans-contextual relations between self-determination theory and theory of planned behaviour variables. Specifically, an exhaustive electronic database (e.g., Medline, PsychINFO, ISI Web of Knowledge, Scopus) and manual literature search for articles from 2003, the year of inception of the trans-contextual model, until January 31, 2014 that provided full or partial tests of the trans-contextual model. For the electronic database search, the following search strings were used to generate lists of potentially eligible articles that were then consolidated after removing duplicates: "trans-contextual"; "transcontextual"; "theory of planned behavior*" with "self-determination theory" or "intrinsic motivation", "autonomy" or "autonomous motivation"; and "self-determination theory" with "intention" or "attitude" or "social cogniti*". For the manual search we examined the reference lists of all published articles on the trans-contextual model for any

additional articles including unpublished manuscripts. In addition, attempts were made to track down fugitive literature by contacting key authors and ask for their unpublished data sets. The selection and contact of authors conducting research in this area was comprehensive and systematic. All first authors of previous research studies adopting the trans-contextual model were contacted in the first instance. Each author was also asked if they knew of any other researcher conducting research using the model and to provide contact details. This resulted in a 'cascade' system of contact with other researchers known or thought to be conducting research on the model until all potential referrals had been exhausted.

Studies were included in the meta-analysis if they provided a full empirical test of the trans-contextual model (i.e., included all the key components of the model) or at least provided sufficient tests of the key trans-contextual aspect and component theories of the model. Although numerous studies that integrated components from self-determination theory and the theory of planned behaviour were located (for further details see Hagger & Chatzisarantis, 2009b), studies were only eligible for the current analysis if they included a test of the fundamental trans-contextual effect proposed in the model. Studies must, therefore, have included measures of autonomy support or autonomous motivation in an educational context and measures of autonomous motivation or variables from the theory of planned behaviour in an out-of-school context as the minimum criteria for inclusion in the analysis. Studies also needed to contain sufficient statistical information such as zero-order correlation coefficients for correlational studies or cell means, standard deviations, *F*-ratios, or effect size statistics (e.g., Cohen's *d*) for experimental or intervention studies to calculate an effect size. The raw effect sizes (zero-order correlations) were extracted and subjected to Hunter and Schmidt's (1994) random-effects (equivalent) meta-analytic techniques correcting for sampling and measurement error (Hagger, 2006). The resulting corrected averaged effect sizes were used as input for a path-analysis testing the proposed network of relations among the model constructs, particularly the trans-contextual effects (Cheung & Chan, 2005; Viswesvaran & Ones, 1995).

5 RESULTS

5.1 Overview of results

Findings of the studies from the current thesis provide global support for the main hypotheses of the trans-contextual model proposed in Chapter 3 (see Corollaries 1-3) and illustrated in Figure 1. A brief at-a-glance summary of the findings of each study can be found in Table 2. The key findings related to the model corollaries are as follows:

- (1) Perceived autonomy support was consistently and significantly linked to autonomous motivation in a PE context (Corollary 1)
- (2) Autonomous motivation in PE had a significant effect on autonomous motivation toward physical activity in a leisure time context, the proposed 'trans-contextual' effect. Perceived autonomy support in PE was also significantly and indirectly related to autonomous motivation in a leisure time context (Corollary 2).
- (3) Autonomous motivation toward physical activity in a leisure-time context was significantly related to intentions toward future physical activity participation and actual physical activity behaviour via the mediation of attitudes and perceived behavioural control from the theory of planned behaviour. Intentions toward leisure-time physical activity significantly predicted future physical activity behaviour and mediated the effect of attitudes, subjective norms, and perceived behavioural control on physical activity behaviour (Corollary 3).
- (4) The effects of the model remained significant even after controlling for additional variables such as past physical activity behaviour and perceived autonomy support from other relevant sources such as peers and parents.
- (5) Results were consistent across samples and national groups and research testing the trans-contextual model by other researchers, re-

viewed as part of this thesis in Study 4, indicated global support for model hypotheses.

- (6) Statistical synthesis of studies adopting the trans-contextual model from the current thesis and by other research groups in Study 5 revealed consistency in effects and support for the hypothesized pattern of relationships.
- (7) The trans-contextual model was used as a basis for a more generalized model incorporating volitional processes from dual-process models and automatic processes from dual-systems theories in Study 6. The resulting integrated behaviour change model serves as the basis of future research as to whether the model provides an effective and comprehensive explanation of physical activity behaviour.

Results of the tests of the model across the three empirical studies (Studies 1-3), the narrative and empirical reviews of the model (Study 4 and 5), and the more generalized model based on the trans-contextual model (Study 6) are outlined in the next sections.

5.2 Study 1: Initial test of the trans-contextual model

The purpose of this initial study was to provide the first test of the proposed trans-contextual motivational in a sample of 13-16 year-old school pupils. Overall the aim was to investigate the effect of young people's perceived autonomy support in a PE context on perceived locus of causality in PE and leisure time, and intentions and physical activity behaviour in a leisure-time context. Path analysis was used to examine the proposed hypotheses of the trans-contextual model outlined in the background section. Perceived autonomy support in a PE context was found to have an indirect effect on participants' physical activity behaviour. The indirect effect of perceived autonomy support on physical activity was through a motivational sequence involving intrinsic and identified (autonomous) regulation in PE and leisure-time contexts, and attitudes, perceived behavioural control, and intentions in a leisure-time context. The proposed trans-contextual model explained the proposed effect of perceived autonomy support and self-determined motivational regulations in a PE context on young people's self-determined regulations, physical activity intentions, and behaviour in a leisure-time context. Overall, the study provides initial support for the proposed model and answers two key questions important to physical educators: does supporting children's motivation in PE lead them to be more motivated to take up physical activity outside of school in their leisure time, and does that motivation lead to actual intentions to participate in physical activity in the future and actual physical activity behaviour, prospectively measured?

5.3 Study 2: Cross-cultural replication of the trans-contextual model

The aim of Study 2 was to test the replicability and cross-cultural invariance of the trans-contextual model of motivation across four samples of school children from diverse cultures. A series of path-analytic models tested whether a model outlining the main trans-contextual model hypotheses specified a priori fit data from participants in each of the British, Greek, Polish, and Singaporean samples. Multi-sample analysis tested the invariance of the hypothesised relationships of the proposed trans-contextual model across the four national samples. Overall, the pattern of relationships in these further tests provided further replication and support for the hypotheses of the trans-contextual model across cultures and demonstrated that the pattern of effects is universal and consistent across samples in keeping with assumptions from the social-cognitive and motivational theories that contribute to the trans-contextual model.

5.4 Study 3: Extending the trans-contextual model

The aim of this study was to test an extended version of the trans-contextual model of motivation for health-related physical activity in samples of school children from four nations. The extended model proposes a motivational sequence in which perceived autonomy support from teachers in a PE context and from peers and parents in a leisure-time physical activity context predict autonomous motivation, intentions, and physical activity behaviour in a leisure-time context. Path-analyses controlling for past behaviour tested whether the proposed extended model was supported in all samples. In addition to the hypotheses of the trans-contextual model, the effects of perceived autonomy support from peers and parents on leisure-time autonomous motivation was also tested. Results revealed that there was a unique effect of perceived autonomy support from PE teachers on leisure-time autonomous motivation even when controlling for the significant effects of perceived autonomy support from peers and parents. The study provided support for the extended model and an explanation of the processes by which perceived autonomy support from different sources affect health-related physical activity motivation across these contexts.

5.5 Study 4: Review of the trans-contextual model

Study 4 presents a conceptual and narrative review of the trans-contextual model. The review outlines the trans-contextual model and its motivational sequence in which perceived support for autonomous motivation for a given ac-

tivity leads to autonomous motivation in educational contexts, such as PE, but also to autonomous motivation toward related activities, such as physical activity, in extramural 'leisure time' contexts. Autonomous motivation toward activities in extramural contexts is proposed to be associated with attitudes, perceived control, and intentions to perform the activity in future and actual behaviour. Recent prospective and intervention research that has applied the model to explain the transfer of autonomous motivation toward physical activity from a PE context to a leisure-time context is reviewed. Important additional questions arising from the model such as what constitutes a successful test of the model and whether it can be rejected are also addressed. The contribution of research from other laboratories and research groups adopting the trans-contextual model since the first test (see Study 1) is also reviewed. The review concludes by outlining how the model can be applied for intervention research and how educators can capitalize on the transfer of motivation across contexts to promote better engagement in physical activity in out-of-school 'leisure time' contexts.

5.6 Study 5: Review of model corollaries, responses to critiques and meta-analysis

The purpose of Study 5 was to clarify some of the key corollaries of the trans-contextual model and lay to rest some critiques that have been levelled at the model since its inception. It also aimed to provide an up-to-date quantitative synthesis of tests of the model, from this thesis and by other research groups, using meta-analytic techniques and to provide a global test of model hypotheses based on the meta-analytic data. Results indicated that three key corollaries define the trans-contextual model: the effect of autonomy support on autonomous motivation in the physical education context (Corollary 1), the trans-contextual effect of self-determined motivation toward activities in the physical education context to self-determined motivation toward physical activity in a leisure-time out-of-school context (Corollary 2), and the self-determined motivation in an extramural context is related to future intention to engage in extramural physical activities and actual behavioural engagement (Corollary 3). These corollaries encapsulate numerous specific hypotheses relating to the effects among the numerous model constructs. The corollaries have formed the basis of the current thesis, and these have been clarified and confirmed in Study 5. The corollaries and associated hypotheses were confirmed in the path analysis of the results of studies ($n = 19$, yielding 24 effects) identified in our literature search as testing the trans-contextual model and subjected to meta-analytic synthesis to correct for sampling and measurement error (Hunter & Schmidt, 1994). The meta-analysed correlation matrix was used as an input for a path analysis that tested the proposed model and its associated hypotheses. Results supported the pervasive effects of perceived teacher autonomy support on self-

determined motivation in the physical education context and on self-determined motivation toward leisure-time physical activity in an out-of-school context mediated by self-determined motivation in the physical education. Self-determined motivation in leisure time also predicted intentions to engage in physical activity in the future and actual physical activity behaviour via the mediation of the belief-based components, particularly attitudes and perceived behavioural control, from the theory of planned behaviour. In addition, there were statistically significant and substantial total effects of perceived autonomy support on intentions and behaviour mediated by the proposed motivational sequence. Overall, the meta-analysis supported the proposed nomological network of relations among the model variables across available studies identified in the literature search.

The study also visited, and attempted to offer solutions to, problems and critiques levelled at the trans-contextual model, namely, (1) whether the model is falsifiable empirically, (2) whether the beliefs from the theory of planned behaviour are necessary inclusions as an intermediary between autonomous motivation in leisure-time, out-of-school contexts and intentions and behaviour, and (3) whether the model can permit the inference of causal relations among its constructs. Focusing on the first issue, my analysis indicated that falsifying the trans-contextual model required lack of empirical support for one of the three corollaries of the model. Specifically, a zero or trivial effect size for the relationship between perceived autonomy support and autonomous motivation in the educational context (physical education), for the relationship between autonomous motivation across educational (physical education) and out-of-school (leisure-time physical activity) contexts, or for the relationship between autonomous motivation in an out-of-school context (leisure-time physical activity) and intentions and actual behaviour in the same context should lead to a rejection of the model. It is, therefore, important that three these corollaries are supported. This would also lead to an indirect effect of perceived autonomy support in education on intentions and actual behaviour in an out-of-school context via the motivational sequence proposed in the model. This captures the essence and purpose of the trans-contextual model and without support for these, the model loses theoretical relevance and purpose.

With respect to the second issue, the belief-based variables from the theory of planned behaviour, attitudes, subjective norms, and perceived behavioural control, are necessary intermediaries between autonomous motivation in the out-of-school context and intentions and behaviour toward leisure-time physical activity because they outline the process by which motives are converted into future action. Individuals with autonomous motives toward physical activity in leisure time are likely to be compelled to seek out similar opportunities in future in order to satisfy psychological needs. In order to do so they need to bring their beliefs toward that behaviour in line with their motives so that they can actively form future intentions and plans to engage in that behaviour in future. This is consistent with Deci and Ryan's (1985) original theorising on self-determination theory in which they suggest that social cognitive variables will

be consistent with motivation. It is also consistent with Vallerand's (1997) model in which he hypothesises that people will generate schema with respect to their motivational orientations that will form a template for the formation of motives and action toward similar behaviours in future. So the belief-based constructs offer an explanation of mechanism and process in the model.

Finally, I focus on the third issue, the issue of causality in the trans-contextual model. I have proposed the hypotheses in the model as a motivational sequence where the ordering of the process by which perceived autonomy support and autonomous motivation in an educational context impacts on autonomous motivation, intentions, and actual behaviour in an out-of-school context. This is based on theory and the proposed pattern of effects reported in previous research. However, a problem for the model is that almost all tests to date have been completed using correlational data. Although these tests have been longitudinal and prospective in design, this does not permit the inference of causality nor does it chart the effect of change on one variable on another e.g. autonomous motivation in education on autonomous motivation out of school. Such causal inferences would be much more effectively derived from experimental and intervention tests of the model. There is preliminary evidence that this is the case, with an intervention promoting autonomy support in school physical education showing effects on the outcome variables in an out-of-school context consistent with the motivational sequence of the trans-contextual model (Chatzisarantis & Hagger, 2009). However, there are precious few interventions of this kind and future research adopting these kinds of designs is needed to ascertain the causal nature of the proposed relations in the trans-contextual model.

5.7 Study 6: An expanded model – The integrated behaviour-change model

The purpose of this review was to use the theoretical integration of the theory of planned behaviour and self-determination theory, outlined in the trans-contextual model, and use it as a basis to develop a comprehensive model of health behaviour change. Analysing contemporary approaches to behavioural engagement, I recognised that the motivational sequence proposed in the trans-contextual model from self-determined motivation to intentions and actual behavioural engagement was principally focused on reasoned, deliberative, and intentional behavioural engagement. Furthermore, similar to the theories of reasoned action and planned behaviour, a considerable 'gap' between intentions and actual behaviour has been noted in tests of the trans-contextual model (e.g., Hagger et al., 2005; Hagger et al., 2009). This imperfect relation is problematic because it represents a shortfall in the likelihood that intentions will be converted into action. I therefore incorporated hypotheses from dual-process models (de Vries et al., 2005; Fuchs et al., 2011; Heckhausen & Gollwitzer, 1987;

Schwarzer, 2008a) and dual-systems theories (Hofmann et al., 2008; Strack & Deutsch, 2004) to address these shortcomings and to develop the model into a more generalised model of health behaviour. I acknowledge that deliberative predictors of health behaviour only paint part of the picture when it comes to understanding behaviour. Research has shown that health behaviour is also related by impulsive, non-conscious attitudes and motives (Eves et al., 2007; Houben, 2010; Keatley et al., 2012; Keatley, Clarke, & Hagger, 2013). These implicit constructs are likely to predict behaviour spontaneously, without conscious deliberation by the actor. They therefore affect behaviour beyond the individual's awareness. So implicit attitudes and autonomous motives, two key constructs identified in past behaviour research, were included as parallel predictors of behaviour. Such predictors are outlined in dual-systems theories that illustrate reflective (deliberative, conscious) and impulsive (spontaneous, non-conscious) routes to behaviour (Hofmann et al., 2008; Strack & Deutsch, 2004).

Another consideration is the importance of addressing the intention-behaviour gap in the integrated model. The action-control approach along with numerous other approaches such as the Action-Control Theory, I-Change model, Health Action Process Approach (HAPA), and the MoVo concept all incorporate a dual phases when it comes to action: a motivational phase and a volitional phase (de Vries et al., 2005; Fuchs et al., 2011; Heckhausen & Gollwitzer, 1987; Schwarzer, 2008a). The motivational phase is considered the phase captured by the theory of planned behaviour, and the trans-contextual model, as the phase in which intentions are developed or formed. It reflects deliberative decision making. However, this presents a problem as frequently individuals do not have sufficient recall ability or cues identified to enact the behaviour. So the volitional phase is a subsequent step in which intentions are furnished with plans, such as cues and prompts, which trigger the planned action. This is through highlighting salient cues and helping individuals remember their intentions. This is often done through a process of implementation intentions and action planning, in which an individual states when and where, and sometimes how, they will enact their intentions. This has been shown to be very effective in increasing the strength of the intention-behaviour relationship, including in physical activity (Hagger & Luszczynska, 2014). In the model, planning interventions such as these serve to moderate the intention-behaviour relationship. By incorporating dual-process theories to account for implicit processes and dual-phase models to account for volition, alongside the integration of contemporary social-cognitive and motivational theories in a single model, the integrated behaviour-change (IBC) model provides a comprehensive approach to understanding physical activity behaviour. I call on researchers to use this model as a framework to explain the processes that underpin participation in health-related behaviour, including physical activity.

TABLE 2 Summary of study characteristics and findings for the four studies in the current thesis

Study	Sample	Model	Findings
1	295 school pupils studying in three state secondary schools (boys = 132, girls = 163, range = 13–16 years, mean age = 14.5 years, $SD = 1.35$)	Standard trans-contextual model as presented in Figure 1, only with distinct perceived locus of causality constructs (<i>intrinsic, identified, introjected, and external</i> regulations) rather than single autonomous motivation constructs	Perceived autonomy support in PE had a direct effect on intrinsic and identified motives in PE. The four types of regulation from the perceived locus of causality in a PE context was positively related to the same regulatory types in the perceived locus of causality in a leisure-time physical activity context. Intrinsic motivation in a leisure time physical activity context also had a significant effect on attitudes and perceived behavioural control while identified regulation had a significant effect on attitudes. External regulation positively predicted subjective norms. Attitudes and perceived behavioural control completely mediated the effect of intrinsic motivation and identified regulation on intention. There was a small direct impact of perceived autonomy support on leisure-time physical activity behaviour and a significant total effect. However, the majority of this relation was accounted for by the motivational sequence proposed in the trans-contextual model. Finally, the correlation between past and follow-up behaviour was completely mediated by the trans-contextual model.
2	School pupils from state secondary schools, British sample, $N = 222$; 118 girls, 104 boys, M age = 14.68 years, $SD = 1.47$; Greek sample, $N = 93$, 57 girls, 36 boys, M age = 13.99 years, $SD = 0.80$); Polish sample, $N = 103$, 56 girls, 47 boys M age = 16.28 years, $SD = 1.12$; Singaporean sample, $N = 133$, 67 girls, 66 boys, M age = 13.32 years, $SD = 0.47$	Standard trans-contextual model as outlined in Figure 1	The proposed pattern of the relationships of the trans-contextual model was consistent across cultures despite some minor variations in the significance and strength of some relationships. Overall, autonomous motives in a PE context had significant total effects on autonomous motivation in a leisure-time context in the British, Polish, and Singaporean samples. The hypothesised indirect effect of perceived autonomy support on autonomous motives leisure time via autonomous motivation in PE was found only in the British sample. Only in the Polish sample did perceived autonomy support not have any relationship with autonomous motives in leisure time, direct or indirect. Autonomous motives in a leisure time physical activity context predicted attitudes and PBC, and these variables mediated the relationship between autonomous motivation and physical activity intentions.

3	<p>School pupils from state secondary schools, British sample $N = 201$, boys = 94, girls = 116; M age = 13.19, $SD = 1.12$); Estonian sample $n = 268$, boys = 117, girls = 151, M age = 15.04, $SD = 0.91$); Finnish sample $N = 127$, boys = 55, girls = 72, M age = 14.30, $SD = 0.49$); Hungarian sample $N = 235$, boys = 114, girls = 121, M age = 14.02, $SD = 0.99$</p>	<p>Modified trans-contextual model including measures of perceived autonomy support from peers and parents on autonomous motivation toward physical activity in a leisure-time context</p>	<p>The within-context effect of perceived autonomy support on autonomous motivation, as found in the PE context in all samples. There was also a significant effect of autonomous motivation across PE and leisure time contexts consistent with model hypotheses. Importantly, perceived autonomy support from other sources had significant effects on leisure-time autonomous motivation, but the effects were weak and inconsistent across samples. Perceived autonomy support from peers had weak effects on leisure-time autonomous motivation in the Estonian, Finnish and Hungarian samples. Perceived autonomy support from parents was related to autonomous motivation only in the British and Hungarian samples. Perceived autonomy support from PE teachers on leisure-time autonomous motivation is independent of the effects of perceived autonomy support from peers and parents. This effect was consistent across all samples with no cultural variations. This corroborates an original hypothesis of the trans-contextual model that perceived autonomy support from PE teachers will have a pervasive effect on motivation within the PE context, but also on autonomous motivation outside of school. This implies that the transfer of motivation from one context (PE) to another (leisure time) is the mechanism by which perceived autonomy support in PE influences autonomous motivation in a leisure-time context. The effect of autonomous motivation toward physical activity in leisure time on intentions was mediated by the attitude and perceived behavioural control variables from the TPB. There were also direct effects of autonomous motivation on intentions in the British and Hungarian samples. Attitudes and perceived behavioural control had significant effects on intentions and intentions on behaviour in a leisure-time context as predicted. The effects were independent of the effects of past behaviour.</p>
4	<p>Narrative review</p>	<p>Review of tests of the trans-contextual model since its advent in 2003 (as reported in Study 1)</p>	<p>This review presents the hypotheses of the trans-contextual model of motivation, the aim of which is to map the processes by which perceived autonomy support autonomous from significant others in educational contexts (e.g., PE) leads to autonomous motivation toward related activities in extramural contexts (e.g., leisure time) as well as intentions and future behaviour (e.g., physical activity). The review summarises the unique integration of three different</p>

theoretical perspectives to form the tenets of the model and demonstrates the extensive correlational and experimental evidence supporting the model from multiple studies from my research and those in other research groups. The review also provides recommendations as to how research on the model can be advanced, particularly the need for intervention research and tests in other educational settings away from the PE and leisure-time physical activity contexts. The model can inform practice by defining the content of interventions for educators to promote extramural activities by promoting motivation within school.

5 Conceptual review and meta-analysis

Review of corollaries and responses to critiques of the trans-contextual model and a meta-analysis of the research on the trans-contextual model from the work in the current thesis and model tests conducted by other researchers

In the review the key propositions and associated hypotheses of the trans-contextual model were outlined and clarified. This served as a precursor to addressing some of the critiques levelled at the trans-contextual model based on theory and the evidence base for the model. The review outlines what would constitute a null test or failed replication of the model through the rejection of fundamental hypotheses. The review also addressed the necessity of the belief-based variables as mediators of the effects of self-determination theory on intentions and behaviour in educational contexts and outlines the issues surrounding causality. The path analysis of the model based on the correlations derived from the meta-analysis of trans-contextual model hypotheses corroborated the proposed pattern of relationships and mediation effects. Specifically, the motivational sequence that charts the effects of distal, environmental factors that indicate support for self-determined motivation in an educational context on more proximal predictors of behaviour, including self-determined motivation and intentions for related activities in an extramural context, holds across samples and studies. In terms of the hypothesized mechanisms for the model, the direct effects of self-determined motivation on intentions and behaviour were small when compared to the indirect effects of these variables mediated by the proximal predictors of the outcome variables from the theory of planned behaviour. This provides evidence to support the hypothesised relationships between self-determined motivation toward engaging in activities outside of school and intentions and behaviour in an out-of-school context mediated by attitudes and perceptions of control. Overall,

the current results appear to demonstrate support for the transfer of self-determined motivation across contexts and, most importantly explain a substantial proportion of the variance in intentions and prospectively-measured behaviour in out-of-school contexts.

A conceptual review which broadens and deepens the key hypotheses from the trans-contextual model and incorporates hypotheses from dual-process and dual-systems theories to account for volitional components and automatic processes in the explanation of health behaviour.

The review introduces the integrated behaviour-change (IBC) model which aimed to bring together leading theories to arrive at a comprehensive perspective on the psychological processes involved in predicting and changing physical activity behaviour. Central to the model is that health behaviour, like physical activity, is largely predicted by intentions. The theory of planned behaviour, a leading theory of intention, provides the core set of hypotheses and serves as a framework for the model. Self-determination theory, a needs-based theory of motivation, was adopted as a means to explain the origins of the belief-based behavioural antecedents in the theory of planned behaviour. This is presented in the IBC model as a motivational sequence in which motives from self-determination theory predict physical activity intentions mediated by the belief based antecedents from the theory of planned behaviour. I also incorporated hypotheses from dual-phase models, such as the model proposed by Heckhausen and Gollwitzer (1987), to include a volitional phase, separate from the intentional phase, in the model. The volitional phase incorporates action planning, a key construct implicated in the promotion of effective and efficient conversion of intentions into behaviour. Finally, I incorporated hypotheses from dual-systems theories of action to account for implicit processes that affect health behaviour. This is in recognition that behaviour is impacted by factors that operate outside individuals' awareness and based on evidence that implicit processes predict physical activity behaviour (e.g., Keatley et al., 2012). In the IBC model I outlined the theoretical basis for the integration of its component hypotheses supported by evidence from our own work and that of others. The model provides the basis for future tests of the model using correlational, prospective, and experimental designs.

6 DISCUSSION

The research reported in the present thesis proposed, tested, and evaluated the efficacy of a multi-theory trans-contextual model that charts the motivational processes by which young people's self-determined or *autonomous* motivation in a PE context, and its perceived support from PE teachers, is transferred to motivation, intentions, and actual physical activity behaviour in a leisure-time context. Adopting a unique three-wave prospective design, the series of studies in the present thesis provided support for the motivational sequence proposed in the model across samples of young people aged 13-16 years from secondary schools in seven national groups. In addition, the work also extends the model to a more generalized model that incorporates the same component theories of the trans-contextual model alongside contemporary theory on volitional processes and implicit processes. This extended model forms the basis for new hypotheses and a more comprehensive explanation of physical activity behaviour. The aim of this section is to summarise the main findings of the studies as a group, to evaluate their implications for future theory and research, and identify the basis the current findings provide for practitioners such as health psychologists, behavioural medics, teachers, coaches, and parents to promote greater leisure-time physical activity in young people.

6.1 Efficacy of the trans-contextual model

Drawing together the studies presented in the current thesis, there are seven main findings: (1) young people's perceived support for autonomy and autonomous motivation in PE are significantly related to autonomous motivation toward physical activity in a leisure time context (Studies 1-3); (2) perceived support for autonomy and autonomous motivation in PE have significant indirect effects on intentions to engage in leisure-time physical activity and self-reported physical activity behaviour (Studies 1-3); (3) the pattern of effects proposed in the model are consistent across multiple samples from seven nations and re-

main largely invariant (Studies 2 and 3); (4) the effects remain even after controlling for extraneous factors such as past physical activity behaviour (all studies) and autonomy support from other sources (Study 3); (5) the tenets of the model have been tested, and the pattern of effects replicated, by researchers in other laboratories (Studies 4 and 5); (6) the critiques of the model including whether it can be falsified, the role of beliefs from the theory of planned behaviour, and the causal nature of relations in the model can be addressed through theory, further tests, and boundary conditions; and (7) the integration of the theory of planned behaviour and self-determination theory in the trans-contextual model provide an excellent starting point for the development of a more comprehensive model of behaviour change including implicit processes and volitional planning.

A central relationship in the trans-contextual model is the link between autonomous forms of motivation in the different contexts, PE and leisure-time physical activity. Current results from the series of studies presented in this thesis, and the analysis of research from other labs summarised in Study 4 and confirmed in the meta-analysis conducted in Study 5, demonstrate that this trans-contextual effect has considerable support. This supports the hypothesis in the model and is consistent with Vallerand's (1997) proposal that autonomous motivation in one context leads to motivation toward similar behaviours and activities in different contexts. In addition, findings also indicate that perceived support for autonomous motivation in PE is also linked to autonomous motivation in PE and, indirectly, with autonomous motivation in leisure-time. Furthermore, autonomous motivation in leisure time has a concomitant effect on intentions to engage in leisure-time physical activity and actual physical activity behaviour. This is also consistent with Vallerand's (1997) model which indicates that autonomous motivation in one contexts leads to concomitant cognitive, affective, and behavioural responses in another. It is also consistent with Deci and Ryan's (Deci & Ryan, 1985, 2000) original hypothesis that autonomous motivation will affect cognition and plans to engage in behaviours that will be consistent with the satisfaction of psychological needs. The trans-contextual model is the first attempt to explicitly chart these relationships and has important implications for practice.

6.2 Interventions and future applied research

Given that perceived autonomy support is related to actual autonomy support from significant others, in this case PE teachers, in educational contexts (McLachlan & Hagger, 2010; Reeve & Jang, 2006) it stands to reason that this would be a sensible point to intervene in order to promote greater motivation toward physical activity outside of school. Therefore, a logical approach to intervention would be to train teachers to adopt autonomy-supportive behaviours such as those outlined by Reeve and Jang (2006). There are preliminary interventions that have trained teachers to be more autonomy supportive and

demonstrated significant effects on physical activity behaviour (e.g., Chatzisarantis & Hagger, 2009). Future research should seek to develop these kinds of interventions in the context of the trans-contextual model, such that the variables of perceived autonomy support and autonomous motivation are included as mediators of the effects on motivation toward physical activity in leisure time, as well as on intentions and actual physical activity behaviour.

Future research should also seek to confirm that autonomy-supportive interventions in PE and leisure time have differential but additive effects on autonomous motivation to engage in future physical activity in leisure time and actual physical activity behaviour. An intervention might seek to promote autonomous motivation in school PE via training PE teachers to be more autonomy supportive, but also encourage significant others in leisure time to be autonomy supportive. Both interventions should have significant effects on intentions and behaviour to engage in physical activity in leisure time, but the pattern of effects and mediators would be different according to the pathways outlined in the model. This would serve to illustrate the different pathways through which the different forms of autonomy support would impact further behaviour and further support the trans-contextual nature of the model. Another important study that needs to be done is an intervention based on self-determination theory through autonomy support in PE, as suggested above, alongside an intervention to change attitudes and perceived behavioural control as conceptualized in the theory of planned behaviour and Ajzen's (2003a) recommendations and similar interventions in this context (e.g., Chatzisarantis & Hagger, 2005). This would also corroborate the hypotheses of the model by demonstrating that interventions targeting different psychological constructs in the model affect intentions and physical activity behaviour in leisure time differently through the appropriate mediators, namely, autonomous motivation in PE and leisure time for the autonomy-supportive intervention, and attitudes and perceived behavioural control for the theory of planned behaviour intervention. This will provide the basis of a 'trans-contextual model' intervention, a complex intervention illustrating that physical activity behaviour in leisure time can be promoted by targeting appropriate variables in PE and leisure-time contexts, and using appropriate theory-based intervention techniques (Hagger & Hardcastle, 2014; Michie et al., 2011).

6.3 Limitations and key points of contention

While the set of studies in the current thesis have a number of strengths including the adoption of a unique multi-theory approach, the use of three-wave prospective designs in the empirical studies (Studies I-III) in multiple diverse samples, appropriate statistical analyses, and in-depth critical evaluation of the findings in narrative and meta-analytic reviews, there are also a number of limitations and points of contention which should be flagged and discussed. The limitations may put boundary constraints on the implications of the research

and its generalizability as well as pointing to future directions for research that may provide a resolution to the limitations and points of contention. Key limitations and points of contention include the reliability and validity of the self-report measures used to tap the psychological and behavioural constructs in the empirical studies, the evaluation of the 'clinical' or 'practical' significance of the effects of potential interventions based on the trans-contextual model, the potential for within-class variability to affect relations in the model relative to between-participants effects, the characterization of samples as definitively individualist and collectivist, and the reciprocal effects of past behaviour. I will outline each point below and discuss its relevance for the interpretation of findings and how they may be resolved in future research.

The empirical studies adopted in the current research relied heavily on self-report measures of the motivational and social cognitive constructs from the theory and measures of physical activity behaviour. Of primary importance in the initial study (Study I) that developed the trans-contextual model was to ensure that the measures used achieved acceptable levels of validity and reliability. Accordingly, the measures were subjected to four-step confirmatory factor analyses to ensure construct and discriminant validity and further confirmation of predictive and nomological validity was confirmed through testing the measures as part of a test of the omnibus trans-contextual model. These analyses were conducted for each of the studies to provide support for the psychometric evaluation of the constructs. Furthermore, Cronbach alpha and composite reliability coefficients indicated that the measures achieved acceptable levels of internal consistency. Based on these data, the measures of the psychological constructs in the empirical studies for the current research seemed to be fit-for-purpose exhibited satisfactory validity and reliability statistics according to rigorous psychometric analyses. Of course, these variables, like any psychological variables, have inherent limitations given that they reflect static perceptions given by participants at a specific point in time and are, therefore, subject to revision and change. Future research should seek to manipulate these variables and view their impact on behavioural measures, which would provide additional confirmation of their validity. This is something that has been done in other research adopting the trans-contextual model and should be a priority for future research (Chatzisarantis & Hagger, 2009).

Another associated limitation is the adoption of self-reported measures of physical activity behaviour. Self-report measures of behaviour, while used extensively in research in health psychology and beyond, have inherent limitations in terms of their validity and there are many potential issues that may impinge on their validity including the propensity for people to give socially desirable answers and limitations in people's capacity to recall their behaviour, particularly mundane, everyday behaviours. I made sure that the measures of behaviour adopted in the current study while simple and unobtrusive, had been shown to be linked to more comprehensive, objective measures of physical activity. Nevertheless, the measures are still subject to the limitations of self-reported measures of behaviour and this should definitely be a focus of future

research. For example, I have already applied the trans-contextual model to other educational activities such as solving maths problems in the classroom and engaging in maths homework outside of school. In this research I did not only include a self-reported behavioural outcome variable (engaging in maths homework outside of school) but also an objective measure that reflects behaviour (maths homework grades). Results indicated that the psychological variables predicted both the self-reported and objective outcome measures, lending some credibility to the model itself (Hagger et al., 2014), however more work needs to be done adopting more objective behavioural measures (e.g., accelerometers) in the health domain including physical activity.

Another limitation is the practical significance of potential interventions based on the trans-contextual model. In other words, will an autonomy supportive intervention to promote motivation toward physical activity in PE and out-of-school physical activity lead to changes in physical activity that are substantial and meaningful? This is one of the important goals of research in health psychology, i.e. whether theory based interventions can effect a change in outcomes that will lead to meaningful benefit, frequently termed 'clinical' or 'practical' significance (Hagger & Chatzisarantis, 2009a). Research suggests that manipulating autonomy support in the context of the model effects a small-to-medium effect size on physical activity outcomes ($r = 0.34$, $p < .001$; Chatzisarantis & Hagger, 2009). This finding indicates that interventions in school will have efficacy in effecting a change on physical activity behaviour that will be sufficiently substantive to lead to health benefits. Furthermore, research has indicated that medium-sized effects in interventions on children's physical activity is equivalent to approximately 25 additional minutes of physical activity relative to controls (Magnusson, Sigurgeirsson, Sveinsson, & Johannsson, 2011). This is therefore the expected level of change in behaviour from a medium-sized effect of a behavioural intervention. However, future research is needed to ensure that these effects are not only consistent but effective long term.

A further issue that needs discussion is the potential for within-classroom variations to affect the relations between variables in the current empirical studies. In the current empirical studies, participants were pupils from multiple classes and variance in physical activity behaviour could be attributed to class membership as well between individuals. Our path analyses did not control from within-participants effects caused by class membership, which may account, for example, for the effects of a particular teacher or class dynamic on physical activity behaviour of the psychological variables measured in the current study. A number of analytic procedures could be adopted to control for these effects, such as introducing class membership as an independent variable in the model, in a similar way to past behaviour or gender. Another approach would be to use multi-level modeling where group membership is modeled as a within-participants factor and the effects of variables as between-participants factors (e.g., Hollar et al., 2010). This is a limitation of the current studies and

failure to collect data on class membership precludes post-hoc analyses to control for class membership.

In the empirical studies, participants from Eastern European nations were characterized as predominantly collectivist in cultural orientation, namely, the samples from Finland, Estonia and Hungary. It must be stressed that it would be more appropriate to classify these cultures as 'individualist' but with a more collectivist orientation relative to other cultures with highly individualist norms such as the pervading culture existing in the United Kingdom or the United States. Truly collectivist, or interdependent, cultures from the perspective of cross-cultural researchers would be those from Asia, whose population tends to report more extreme scores on the collectivist or interdependent dimensions of scales typically used to evaluate cultural orientations. This characterization notwithstanding, the research examining the findings of the trans-contextual model in these different cultures still enables valid comparisons to be made between cultures that have pervading differences in collectivist and individualist norms. Another possible explanatory factor related to culture is the Power Distance Index (Hofstede, 1983) that indicates the extent to which individuals and groups in a society accept that power is distributed equally, which may affect the extent to which individuals view significant others as more 'democratic' and less 'authoritative'. However, we did not include this measure in the current study, but it might provide an additional dimension to consider when examining the role that perceived autonomy support has on motivation, particularly since autonomy support is perceived to emanate from significant others.

Finally, the significant effects of past behaviour in many of the models indicate the importance of habitual or previous decision making on children's beliefs and perceptions toward physical activity behaviour. It is important to control for past behaviour in order to account for the effect of habit, and excluding past behaviour may provide biased estimates of the effectiveness of psychological factors in the prediction of intentions and behaviour in the trans-contextual model as well as many other social cognitive and motivational models (Ajzen, 2002; Ouellette & Wood, 1998; Sutton, 1994). Overall, the effects of past behaviour have been interpreted as the impact of habit and previous decision making on children's physical activity behaviour. It must, however, be stressed that some of the effects may be reciprocal. For example, the relationship between past behaviour and perceived autonomy support, may reflect greater autonomy support being conferred on more active pupils while less autonomy support and more controlling behaviours may be exhibited toward pupils who are less active. Formal investigation of this possibility is warranted, for example, by employing true longitudinal designs in which past behaviour and perceived autonomy support are measured simultaneously over two points in time and cross-lagged effects tested to establish the direction of the effects or whether the effects are reciprocal in nature.

6.4 Theoretical contribution and future conceptual research

The trans-contextual model makes an original contribution to theory for three reasons: the integration of two apparently disparate theories from the social cognitive and humanistic or organismic traditions into a single motivational model and trans-contextual effects of motivation from one context to another. The theory therefore provides an indication of process as well as predictive capacity to understand physical activity behaviour on the basis of motivation derived from, and supported, by sources such as teachers operating in other similar contexts. There are, however, gaps in the theory as it currently stands, including the role of psychological needs, the need to extend the model to other educational activity beyond physical activity behaviour, and the need to incorporate other processes, such as implicit and volitional processes, to arrive at a more comprehensive explanation of behaviour. I look to future research to resolve these gaps but outline the directions as I see them in the next sections.

From a theoretical perspective it is important that future studies also extend the model in a number of ways. First, it is important that the model is extended to incorporate other mediating variables important to understanding the processes by which perceived autonomy support in PE affects leisure time autonomous motivation toward physical activity and subsequent intentions to engage in physical activity and actual behaviour. A key variable in this regard is basic psychological needs satisfaction. As mentioned previously, the process by which perceived autonomous support affects autonomous motivation is the recognition that the behaviours of significant others highlight the value of the behaviour in satisfying innate psychological needs. As reported in Study 4 of the current thesis, this has recently been supported in an initial test (Barkoukis, Hagger, Lambropoulos, & Torbatzoudis, 2010), but more corroborating evidence is needed to provide support for the role that psychological need satisfaction has on behaviour. A further important extension of the theory is to examine the pattern of effects of motivational transfer from other educational contexts into related behaviours in leisure-time contexts. There is already support for the trans-contextual effects in the context of sport motivation and sport injury rehabilitation (Chan & Hagger, 2012; Chan, Spray, & Hagger, 2011). However, there needs to be additional replications of the model, such as in educational contexts unrelated to PE and physical activity to support the theoretical propositions of the theory. A good example would be the role of perceived teacher support for mathematics in the classroom and young people's motivation to complete maths homework outside of school. This would provide additional corroboration for the overall processes offered by the trans-contextual model and provide evidence that the model has applicability beyond the PE context. Most importantly, it will point to the universality and generalisability of the proposed trans-contextual effects across different samples and national groups.

The component theories that comprise the trans-contextual model are not fallible and while they may provide an indication of the psychological factors

and associated processes related to physical activity participation, they are neither fallible nor complete. The theory of planned behaviour is limited due to its oft-cited intention-behaviour 'gap', the imperfect link between intentions and behaviour. Theories like self-determination theory and the theory of planned behaviour do not provide an account for the impulsive, non-conscious, implicit predictors of behaviour, which have received considerable attention in the health behaviour literature of late (Hall & Fong, 2007, 2011; Hofmann et al., 2008). I have made an attempt to provide a resolution to these shortcomings through the inclusion of propositions from dual-systems and dual-process theories in Study 6 to arrive at the IBC model. By incorporating action planning, through the provision of implementation intentions, researchers may be able to 'bridge' the intention-behaviour 'gap' to some extent. By incorporating implicit measures researchers may be able to evaluate the extent to which behaviours are determined by explicit, deliberative factors, such as those outlined in the trans-contextual model, and the implicit, impulsive factors such as implicit attitudes and self-determined motivation identified in previous research (Eves, Hoppe, & McLaren, 2003; Houben, 2010; Keatley et al., 2012, 2013; Perugini, 2005).

It should also be stressed that the IBC model should be considered a flexible developing framework that draws processes and mechanisms from multiple theories, and should, therefore, not be viewed in any way as axiomatic or final (Schwarzer, 2014). Rather, the model is there to be tested and supported, refuted or modified accordingly. As a recent debate over the theory of planned behaviour illustrated (Ajzen, 2014; Armitage, 2014; Conner, 2014; Hall, 2014; Ogden, 2014; Rhodes, 2014; Schwarzer, 2014; Sniehotta et al., 2014; Trafimow, 2014), there are theories that have provided much in terms of contributing to understanding health behaviour, but as evidence and knowledge increases, limitations and boundary conditions are identified leaving theories exposed as the comprehensive models they may have originally purported to be. But that does not necessarily make them redundant, only ripe for revision or modification to deliberately adapt the theory to address or account for the limitations. The IBC model should be viewed in these terms. For example, the theory does not account for other aspects of the planning process identified in the volitional or implemental phases in other dual-phase theories such as the Rubicon model (Heckhausen & Gollwitzer, 1987), the I-Change model (de Vries et al., 2005), the Health Action Process Approach (Schwarzer, 2008a), and the MoVo concept (Fuchs et al., 2011), among others. It may be that other self-regulation strategies such as coping planning (i.e., the propensity to account for barriers or other eventualities that may 'block' goal directed, intentional behaviour) or self-monitoring (i.e., the propensity to activity log or account for behavioural changes and use the feedback to modify behaviour further) may be components that could be incorporated into the model, perhaps fitting in between intentions and behaviour.

The IBC model is a framework ripe for testing within health contexts, and may be tested through experimentation, perhaps in a partial manner as the hy-

potheses are numerous, and through prospective and longitudinal designs. Confirming these hypotheses may provide researchers more advanced knowledge of the processes underpinning health behaviour, and may also assist in intervention design. This is important for intervention to promote health behaviour such as leisure-time physical activity. Targeting multiple components that are likely to be involved in each of the phases of behavioural enactment will likely be more effective across a population with different levels of motivation and capacity to act on them. Research like this has already been conducted, such as the integration of motivational and implemental intention components (Hagger, Lonsdale, Koka, et al., 2012; Hagger, Lonsdale, & Chatzisarantis, 2012; Milne, Orbell, & Sheeran, 2002). Furthermore, identifying whether a behaviour is strongly related to implicit motives and attitudes is also an advantage for those designing interventions to promote health behaviour. Manipulating the environment is important for individuals whose behaviour is strongly related to implicit motives as interventions focusing on more deliberative factors are likely to be of limited effectiveness. Furthermore, it seems there is recent evidence demonstrating that manipulating implicit motives is possible and has a concomitant effect on behaviour (Houben, Havermans, & Wiers, 2010). Overall, the integrated approaches such as those offered in the current research provide multiple opportunities and pathways for intervention. I look to future researchers to explore and investigate these pathways to derive interventions, based on theory and research, which will be effective, replicable, and inexpensive.

YHTEENVETO

Väitöskirjassa kehitetään ja sovelletaan integroitua moniteoreettista eri ympäristöjen välisiä yhteyksiä kuvaavaa mallia - trans-kontekstuaalista mallia - motivaatiosta. Mallia sovelletaan tutkittaessa prosesseja, joissa koululaisten itsemääräytyneet eli autonominen motivaatio siirtyy liikunnanopetusympäristöstä motivaatioksi liikkua myös toisessa ympäristössä eli vapaa-ajalla. Mallia laajennetaan lopuksi kokonaisvaltaiseksi integroiduksi malliksi terveyteen liittyvästä käyttäytymismuutoksesta.

Lihavuus on lisääntynyt dramaattisesti nuorilla samoin kuin siihen liittyvät terveyshaitat. Myös tutkimus, joka keskittyy tämän epidemian hallintaan liittyviin strategioihin lisääntynyt. Erityisesti fyysisen aktiivisuuden edistäminen nähdään keinona ylläpitää tasapainoa energiankäytössä ja estää liikalihavuuden kehittymistä. Tähän liittyen koululiikunta tarjoaa mahdollisuuden tavoittaa laaja joukko nuoria. Vain harvat tutkimukset ovat selvittäneet motivaation ja siihen yhteydessä olevien sosiaalipsykologisten tekijöiden roolia motiivoiduttaessa koululiikuntaan ja siihen, 'käännykö' tällainen motivaatio fyysisesti aktiivisuudeksi koulun ulkopuolella vapaa-ajan kontekstissa.

Trans-kontekstuaalinen malli yhdistää hypoteeseja johtavista motivaatio-teorioista Decin ja Ryamin (1985) itsemääräämisteoriasta, Vallerandin (2007) motivaation hierarkkisesta mallista ja sosiaaliskognitiivisesta suunnitellun käyttäytymisen teoriasta (Ajzen, 1985) yhdeksi integroiduksi malliksi. Mallin keskeinen hypoteesi kuvaa linkkiä nuorten kokeman liikunnanopettajalta saadun autonomian tuen ja koululiikunnassa ilmenevän itsemääräytyvän eli autonomisen motivaation välillä ja erityisesti koetun autonomian tuen yhteyttä toisessa vastaavanlaisessa ympäristössä, vapaa-ajan liikunta-aktiivisuudessa, ilmenevään fyysiseen aktiivisuuteen ja motivaatioon. Lisäksi vapaa-ajan autonominen motivaatio on yhteydessä aikomukseen osallistua vapaa-ajan liikuntaan tulevaisuudessa. Hypoteesi motivaation mahdollisesta siirtymisestä kontekstista toiseen on tärkeä siksi, että se viittaa siihen, että autonominen motivaatio eri konteksteissa linkittyy ja johtaa aikomukseen toimia terveyttä edistävästi tulevaisuudessa. Tällainen evidenssi on käyttökelpoista kun suunnitellaan interventioita, koska se tarjoaa perusteluja tukea autonomista motivaatiota niissä ympäristöissä, joissa suuri osa kohderyhmää toimii (esimerkiksi koululiikunnassa). Autonomisella motivaatiolla taas on vaikutusta motivaatioon muissa ympäristöissä, johon voi olla vaikeampaa päästä vaikuttamaan (esimerkiksi vapaa-ajan liikuntaan). Tässä väitöskirjassa testataan integroidun mallin hypoteeseja kolmessa empiirisessä tutkimuksessa kolmen aallon prospektiivisellä asetelmalla kahdeksalla toisistaan riippumattomalla ryhmällä 13-16 -vuotiaita koululaisia seitsemästä maasta (Eesti, Englanti, Kreikka, Puola, Singapore, Suomi, Unkari). Kokonaisuuteen kuuluu myös kolme katsausartikkelia, joissa käsitellään mallin keskeisiä käsitteitä, tehdään meta-analyysi mallia soveltavasta tutkimuksesta sekä esitetään kuinka mallin teoreettista integraatiota voidaan laajentaa niin, että päädytään yleistettyyn, integroituun malliin terveyskäyttämisen muutoksesta.

Empiiristen tutkimusten tulokset tukivat mallin keskeisiä oletuksia. Liikunnanopettajilta saaduksi koettu autonomia tuki ennusti autonomista motivaatiota koululiikunnassa sekä autonomista motivaatiota, sosiaalis-kognitiivisia uskomuksia, aikomuksia liikkua tulevaisuudessa ja fyysistä aktiivisuutta vapaa-ajan liikuntakontekstissa. Kokonaisuudessaan tutkimukset tukivat esitettyä mallin motivaatiosekvenssiä. Katsausartikkeleissa nostetaan esiin malliin liittyvien empiiristen tutkimusten tulosten pysyvyyttä, käsitellään malliin liitettyä kritiikkiä, esitetään mahdollisia ratkaisuja, tarjotaan tukea mallille meta-analyysistä ja esitetään kuinka yksi osa trans-kontekstuaalisesta mallista, itsemääräämisteorian ja suunnitellun käyttäytymisen teorian integraatio, muodostaa perustan yleistyneelle mallille käyttäytymisen muutoksesta.

REFERENCES

- Ajzen, I. 1985. From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action-control: From cognition to behavior* (pp. 11-39). Heidelberg: Springer.
- Ajzen, I. 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Ajzen, I. 1998. Models of human social behavior and their application to health. *Psychology and Health*, 13, 735-739.
- Ajzen, I. 2002. Residual effects of past on later behavior: Habituation and reasoned action perspectives. *Personality and Social Psychology Review*, 6, 107-122.
- Ajzen, I. 2003a. Behavioural interventions based on the theory of planned behavior. Retrieved April 14, 2003, from University of Massachusetts, Department of Psychology Web site: <http://www-unix.oit.umass.edu/~ajzen>.
- Ajzen, I. 2003b, April 14, 2003. Constructing a TPB questionnaire: Conceptual and methodological considerations. Retrieved April 1, 2003, from <http://www-unix.oit.umass.edu/~ajzen>
- Ajzen, I. 2011. The theory of planned behaviour: Reactions and reflections. *Psychology & Health*, 26, 1113-1127.
- Ajzen, I. 2014. The theory of planned behavior is alive and well, and not ready to retire. *Health Psychology Review*.
- Ajzen, I., Brown, T. C., & Carvahal, F. 2004. Explaining the discrepancy between intentions and actions: The case of hypothetical bias in contingent valuation. *Personality and Social Psychology Bulletin*, 30, 1108-1121.
- Ajzen, I., & Driver, B. E. 1991. Prediction of leisure participation from behavioral, normative, and control beliefs: An application of the theory of planned behavior. *Leisure Sciences*, 13, 185-204.
- Ajzen, I., & Fishbein, F. 2008. Scaling and testing multiplicative combinations in the expectancy-value model of attitudes. *Journal of Applied Social Psychology*, 38, 2222-2247.
- Ajzen, I., & Fishbein, M. 1980. *Understanding attitudes and predicting social behavior*. New Jersey: Prentice Hall.
- Ajzen, I., & Fishbein, M. 2004. Questions raised by a reasoned action approach: Comment on Ogden (2003). *Health Psychology*, 24, 431-434.
- Ajzen, I., & Madden, T. J. 1986. Prediction of goal directed behavior: Attitudes, intentions and perceived behavioral control. *Journal of Experimental Social Psychology*, 22, 453-474.
- Albarracín, D., Johnson, B. T., Fishbein, M., & Muellerleile, P. A. 2001. Theories of reasoned action and planned behavior as models of condom use: A meta-analysis. *Psychological Bulletin*, 127, 142-161.
- Albarracín, D., & Wyer, R. S. 2000. The cognitive impact of past behavior: Influences on beliefs, intentions, and future behavioral decisions. *Journal of Personality and Social Psychology*, 79, 5-22.

- Armitage, C. 2014. Time to retire the theory of planned behaviour? *Health Psychology Review*, 1-9.
- Armitage, C. J. 2003. The relationship between multidimensional health locus of control and perceived behavioural control: How are distal perceptions of control related to proximal perceptions of control? *Psychology and Health*, 18, 723-738.
- Armitage, C. J., & Conner, M. 1999a. Distinguishing perceptions of control from self-efficacy: Predicting consumption of a low fat diet using the Theory of Planned Behavior. *Journal of Applied Social Psychology*, 29, 72-90.
- Armitage, C. J., & Conner, M. 1999b. The theory of planned behavior: Assessment of predictive validity and 'perceived control'. *British Journal of Social Psychology*, 38, 35-54.
- Armitage, C. J., & Conner, M. 2000. Attitudinal ambivalence: A test of three key hypotheses. *Personality and Social Psychology Bulletin*, 26, 1421-1432.
- Armstrong, N. 1989. Children are fit but not active! *Education and Health*, 7, 29-33.
- Armstrong, N., Balding, J., Gentle, P., & Kirby, B. 1990. Estimation of coronary risk factors in British school children: A preliminary report. *British Journal of Sports Medicine*, 24, 61-66.
- Back, M. D., Schmulke, S. C., & Egloff, B. 2009. Predicting actual behaviour from the explicit and implicit self-concept of personality. *Journal of Personality and Social Psychology*, 97, 533-548.
- Bagozzi, R. P. 1981. Attitudes, intentions and behavior: A test of some key hypotheses. *Journal of Personality and Social Psychology*, 41, 607-627.
- Bagozzi, R. P. 1984. Expectancy-value attitude models: An analysis of critical measurement issues. *International Journal of Research in Marketing*, 1, 295-310.
- Bagozzi, R. P., & Kimmel, S. K. 1995. A comparison of leading theories for the prediction of goal directed behaviours. *British Journal of Social Psychology*, 34, 437-461.
- Bandura, A. 1977a. Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215.
- Bandura, A. 1977b. *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. 1989. Human agency in social cognitive theory. *American Psychologist*, 4, 1175-1184.
- Bar-Or, O. 2000. Juvenile obesity, physical activity, and lifestyle changes: Cornerstones for prevention and management. *The Physician and Sports Medicine*, 28, 186-194.
- Barbeau, A., Sweet, S. N., & Fortier, M. 2009. A path-analytic model of self-determination theory in a physical activity context. *Journal of Applied Biobehavioral Research*, 14, 103-118.
- Barkoukis, V., Hagger, M. S., Lambropoulos, G., & Torbatzoudis, H. 2010. Extending the trans-contextual model in physical education and leisure-time contexts: Examining the role of basic psychological need satisfaction. *British Journal of Educational Psychology*, 80, 647-670.

- Bentler, P. M. 2004. EQS structural equations modeling software (Version 6.1) [Computer Software]. Encino, CA: Multivariate Software.
- Bentler, P. M., & Speckart, G. 1981. Attitudes "cause" behaviours: A structural equation analysis. *Journal of Personality and Social Psychology*, 40, 226-238.
- Berenson, G. S. 1986. Causation of cardiovascular disease risk factors in children. New York: Raven Press.
- Blanchard, C. M., Kupperman, J., Sparling, P., Nehld, E., Rhodes, R. E., Courneya, K. S., . . . Rupph, J. C. 2008. Ethnicity and the theory of planned behavior in an exercise context: A mediation and moderation perspective. *Psychology of Sport and Exercise*, 9, 527-545.
- Blanchard, C. M., Kupperman, J., Sparling, P. B., Nehl, E., Rhodes, R. E., Courneya, K. S., & Baker, F. 2009. Do ethnicity and gender matter when using the theory of planned behavior to understand fruit and vegetable consumption? *Appetite*, 52, 15-20.
- Blanchard, C. M., Rhodes, R. E., Nehl, E., Fisher, J., Sparling, P., & Courneya, K. S. 2003. Ethnicity and the theory of planned behavior in the exercise domain. *American Journal of Health Behavior*, 27, 579-591.
- Bozionelos, G., & Bennett, P. 1999. The theory of planned behaviour as predictor of exercise: The moderating influence of beliefs and personality variables. *Journal of Health Psychology*, 4, 517-529.
- Brawley, L. R. 1993. Introduction to the special issue: Application of social psychological theories to health and exercise behavior. *Journal of Applied Sport Psychology*, 5, 95-98.
- Cale, L., & Almond, L. 1992. Children's physical activity levels: A review of studies conducted on British children. *Physical Education Review*, 15, 111-118.
- Calitri, R., Lowe, R., Eves, F. F., & Bennett, P. 2009. Associations between visual attention, implicit and explicit attitude and behaviour for physical activity. *Psychology and Health*, 24, 1105-1123.
- Centers for Disease Control and Prevention. 2003. Physical activity levels among children aged 9-13 years - United States, 2002. *Mortality and Morbidity Weekly*, 52, 785-788.
- Chan, D. K. C., & Hagger, M. S. 2012. Trans-contextual development of motivation in sport injury prevention among elite athletes. *Journal of Sport & Exercise Psychology*, 34, 661-682.
- Chan, D. K. C., Spray, C., & Hagger, M. S. 2011. Treatment motivation for rehabilitation after a sport injury: Application of the trans-contextual model. *Psychology of Sport and Exercise*, 12, 83-92.
- Chatzisarantis, N. L. D., Biddle, S. J. H., & Meek, G. A. 1997. A self-determination theory approach to the study of intentions and the intention-behaviour relationship in children's physical activity. *British Journal of Health Psychology*, 2, 343-360.

- Chatzisarantis, N. L. D., & Hagger, M. S. 2005. Effects of a brief intervention based on the theory of planned behavior on leisure time physical activity participation. *Journal of Sport and Exercise Psychology*, 27, 470-487.
- Chatzisarantis, N. L. D., & Hagger, M. S. 2007. Mindfulness and the intention-behavior relationship within the theory of planned behavior. *Personality and Social Psychology Bulletin*, 33, 663-676.
- Chatzisarantis, N. L. D., & Hagger, M. S. 2008. Influences of personality traits and continuation intentions on physical activity participation within the theory of planned behaviour. *Psychology and Health*, 23, 347-367.
- Chatzisarantis, N. L. D., & Hagger, M. S. 2009. Effects of an intervention based on self-determination theory on self-reported leisure-time physical activity participation. *Psychology and Health*, 24, 29-48.
- Chatzisarantis, N. L. D., Hagger, M. S., Biddle, S. J. H., & Karageorghis, C. 2002. The cognitive processes by which perceived locus of causality predicts participation in physical activity. *Journal of Health Psychology*, 7, 685-699.
- Chatzisarantis, N. L. D., Hagger, M. S., Biddle, S. J. H., Smith, B., & Wang, C. K. J. 2003. A meta-analysis of perceived locus of causality in exercise, sport, and physical education contexts. *Journal of Sport and Exercise Psychology*, 25, 284-306.
- Cheung, M. W. L., & Chan, W. P. M., 40. 2005. Meta-analytic structural equation modeling: A two-stage approach. *Psychological Methods*, 10, 40-64.
- Cohen, J. 1987. *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Conner, M. 2014. Extending not retiring the theory of planned behaviour: a commentary on Sniehotta, Preseau and Araújo-Soares. *Health Psychology Review*, 1-5.
- Conner, M., & Abraham, C. 2001. Conscientiousness and the theory of planned behavior: Toward a more complete model of the antecedents of intentions and behavior. *Personality and Social Psychology Bulletin*, 27, 1547-1561.
- Conner, M., & Armitage, C. J. 1998. Extending the Theory of Planned Behavior: A review and avenues for further research. *Journal of Applied Social Psychology*, 28, 1429-1464.
- Conner, M., & Norman, P. 1998. Social cognition models in health psychology. *Psychology and Health*, 13, 179-185.
- Conner, M., Rodgers, W., & Murray, T. 2007. Conscientiousness and the intention-behavior relationship: Predicting exercise behavior. *Journal of Sport and Exercise Psychology*, 29, 518-533.
- Conner, M., Warren, R., Close, S., & Sparks, P. 1999. Alcohol consumption and the theory of planned behavior: An examination of the cognitive mediation of past behavior. *Journal of Applied Social Psychology*, 29, 1676-1704.

- Craig, L. C. A., Love, J., Ratcliffe, B., & McNeill, G. 2008. Overweight and Cardiovascular Risk Factors in 4-to 18-Year-Olds. *Obesity Facts*, 1, 237-242.
- Darker, C. D., French, D. P., Eves, F. F., & Sniehotta, F. F. 2010. An intervention to promote walking amongst the general population based on an 'extended' theory of planned behaviour: A waiting list randomised controlled trial. *Psychology and Health*, 25, 71-88.
- de Vries, H., Mesters, I., van de Steeg, H., & Honing, C. 2005. The general public's information needs and perceptions regarding hereditary cancer: An application of the Integrated Change Model. *Patient Education and Counseling*, 56, 154-165.
- Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R. 1994. Facilitating internalization: The self-determination theory perspective. *Journal of Personality*, 62, 119-142.
- Deci, E. L., & Ryan, R. M. 1985. *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press.
- Deci, E. L., & Ryan, R. M. 2000. The "What" and "Why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11, 227-268.
- Deci, E. L., Spiegel, N. H., Ryan, R. M., Koestner, R., & Kauffman, M. 1982. Effects of performance standards on teaching styles: Behavior of controlling teachers. *Journal of Educational Psychology*, 74, 852-859.
- Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. 1991. Motivation in education: The self-determination perspective. *Educational Psychologist*, 26, 325-346.
- Doll, J., & Ajzen, I. 1992. Accessibility and stability of predictors in the Theory of Planned Behavior. *Journal of Personality and Social Psychology*, 63, 754-765.
- Edmunds, J. K., Ntoumanis, N., & Duda, J. L. 2007. Perceived autonomy support and psychological need satisfaction in exercise. In M. S. Hagger & N. L. D. Chatzisarantis (Eds.), *Intrinsic Motivation and Self-determination in Exercise and Sport* (pp. 35-51). Champaign, IL: Human Kinetics. doi:
- Evans, C. A., Fielding, J. E., Brownson, R. C., Buffler, P. A., England, M. J., Fleming, D. W., . . . Teutsch, S. M. 2001. Recommendations regarding interventions to reduce tobacco use and exposure to environmental tobacco smoke. *American Journal of Preventive Medicine*, 20, 10-15.
- Eves, F. F., Hoppe, R., & McLaren, L. 2003. Prediction of specific types of physical activity using the theory of planned behavior. *Journal of Applied Biobehavioral Research*, 8, 77-95.
- Eves, F. F., Scott, E. J., Hoppe, R., & French, D. P. 2007. Using the affective priming paradigm to explore the attitudes underlying walking behaviour. *British Journal of Health Psychology*, 12, 571-585.
- Fazio, R. H. 2001. On the automatic activation of associated evaluations: An overview. *Cognition and Emotion*, 2, 115-141.

- Fazio, R. H., & Towles-Schwen, T. 1999. The MODE model of attitude-behaviour processes. In S. Chaiken & Y. Trope (Eds.), *Dual-process theories in social psychology* (pp. 97-116). New York: Guilford Press. doi:
- Fishbein, M., & Ajzen, I. 2009. *Predicting and changing behavior: The reasoned action approach*. New York: Psychology Press.
- Fitch, J. L., & Ravlin, E. C. 2005. Willpower and perceived behavioral control: Influences on the intention-behavior relationship and postbehavior attributions. *Social Behavior and Personality*, 33, 105-123.
- Fortier, M., & Kowal, J. 2007. The flow state and physical activity behaviour change as motivational outcomes: A self-determination theory perspective. In M. S. Hagger & N. L. D. Chatzisarantis (Eds.), *Intrinsic Motivation and Self-determination Theory in Exercise and Sport* (pp. 113-125). Champaign, IL: Human Kinetics. doi:
- French, D. P., & Hankins, M. 2003. The expectancy-value muddle in the theory of planned behaviour - and some proposed solutions. *British Journal of Health Psychology*, 8, 37-55.
- Fuchs, R., Goehner, W., & Seelig, H. 2011. Long-term effects of a psychological group intervention on physical exercise and health: The MoVo concept. *Journal of Physical Activity & Health*, 8, 794-803.
- Gardner, B. 2014. A review and analysis of the use of 'habit' in understanding, predicting and influencing health-related behaviour. *Health Psychology Review*, Advance online publication.
- Gardner, B., Whittington, C., McAteer, J., Eccles, M. P., & Michie, S. 2010. Using theory to synthesise evidence from behaviour change interventions: The example of audit and feedback. *Social Science & Medicine*, 70, 1618-1625.
- Godin, G., Conner, M., & Sheeran, P. 2005. Bridging the intention-behaviour 'gap': The role of moral norm. *British Journal of Social Psychology*, 44, 497-512.
- Godin, G., & Shephard, R. J. 1985. A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Science*, 10, 141-146.
- Godin, G., Valois, R., Jobin, J., & Ross, A. 1991. Prediction of intention to exercise of individuals who have suffered from coronary heart disease. *Journal of Clinical Psychology*, 47, 762-772.
- Hagger, M. S. 2006. Meta-analysis in sport and exercise research: Review, recent developments, and recommendations. *European Journal of Sport Science*, 6, 103-115.
- Hagger, M. S. 2009. Theoretical integration in health psychology: Unifying ideas and complimentary explanations. *British Journal of Health Psychology*, 14, 189-194.
- Hagger, M. S. 2010. Current issues and new directions in psychology and health: Physical activity research showcasing theory into practice. *Psychology and Health*, 25, 1-5.

- Hagger, M. S. 2014. Avoiding the 'déjà-variable' phenomenon: Social psychology needs more guides to constructs. *Frontiers in Psychology*, 5, 52.
- Hagger, M. S., Anderson, M., Kyriakaki, M., & Darkings, S. 2007. Aspects of identity and their influence on intentional behaviour: Comparing effects for three health behaviours. *Personality and Individual Differences*, 42, 355-367.
- Hagger, M. S., & Armitage, C. 2004. The influence of perceived loci of control and causality in the theory of planned behavior in a leisure-time exercise context. *Journal of Applied Biobehavioral Research*, 9, 45-64.
- Hagger, M. S., & Chatzisarantis, N. L. D. 2005. First- and higher-order models of attitudes, normative influence, and perceived behavioural control in the Theory of Planned Behaviour. *British Journal of Social Psychology*, 44, 513-535.
- Hagger, M. S., & Chatzisarantis, N. L. D. 2006. Self-identity and the theory of planned behaviour: Between-and within-participants analyses. *British Journal of Social Psychology*, 45, 731-757.
- Hagger, M. S., & Chatzisarantis, N. L. D. 2007a. Advances in self-determination theory research in sport and exercise. *Psychology of Sport and Exercise*, 8, 597-599.
- Hagger, M. S., & Chatzisarantis, N. L. D. 2007b. Self-determination theory and the theory of planned behavior: An integrative approach toward a more complete model of motivation. In L. V. Brown (Ed.), *Psychology of Motivation* (pp. 83-98). Hauppauge, NY: Nova Science. doi:
- Hagger, M. S., & Chatzisarantis, N. L. D. 2008. Self-determination theory and the psychology of exercise. *International Review of Sport and Exercise Psychology*, 1, 79-103.
- Hagger, M. S., & Chatzisarantis, N. L. D. 2009a. Assumptions in research in sport and exercise psychology. *Psychology of Sport and Exercise*, 10, 511-519.
- Hagger, M. S., & Chatzisarantis, N. L. D. 2009b. Integrating the theory of planned behaviour and self-determination theory in health behaviour: A meta-analysis. *British Journal of Health Psychology*, 14, 275-302.
- Hagger, M. S., & Chatzisarantis, N. L. D. (Eds.). (2007c). *Intrinsic motivation and self-determination in exercise and sport*. Champaign, IL: Human Kinetics.
- Hagger, M. S., Chatzisarantis, N. L. D., Barkoukis, V., Wang, C. K. J., & Baranowski, J. 2005. Perceived autonomy support in physical education and leisure-time physical activity: A cross-cultural evaluation of the trans-contextual model. *Journal of Educational Psychology*, 97, 376-390.
- Hagger, M. S., Chatzisarantis, N. L. D., & Biddle, S. J. H. 2001. The influence of self-efficacy and past behaviour on the physical activity intentions of young people. *Journal of Sports Sciences*, 19, 711-725.
- Hagger, M. S., Chatzisarantis, N. L. D., & Biddle, S. J. H. 2002a. The influence of autonomous and controlling motives on physical activity intentions

- within the Theory of Planned Behaviour. *British Journal of Health Psychology*, 7, 283-297.
- Hagger, M. S., Chatzisarantis, N. L. D., & Biddle, S. J. H. 2002b. A meta-analytic review of the theories of reasoned action and planned behavior in physical activity: Predictive validity and the contribution of additional variables. *Journal of Sport and Exercise Psychology*, 24, 3-32.
- Hagger, M. S., Chatzisarantis, N. L. D., Biddle, S. J. H., & Orbell, S. 2001. Antecedents of children's physical activity intentions and behaviour: Predictive validity and longitudinal effects. *Psychology and Health*, 16, 391-407.
- Hagger, M. S., Chatzisarantis, N. L. D., Culverhouse, T., & Biddle, S. J. H. 2003. The processes by which perceived autonomy support in physical education promotes leisure-time physical activity intentions and behavior: A trans-contextual model. *Journal of Educational Psychology*, 95, 784-795.
- Hagger, M. S., Chatzisarantis, N. L. D., & Harris, J. 2006a. From psychological need satisfaction to intentional behavior: Testing a motivational sequence in two behavioral contexts. *Personality and Social Psychology Bulletin*, 32, 131-138.
- Hagger, M. S., Chatzisarantis, N. L. D., & Harris, J. 2006b. The process by which relative autonomous motivation affects intentional behavior: Comparing effects across dieting and exercise behaviors. *Motivation and Emotion*, 30, 306-320.
- Hagger, M. S., Chatzisarantis, N. L. D., Hein, V., Pihu, M., Soós, I., & Karsai, I. 2007. The perceived autonomy support scale for exercise settings (PASSES): Development, validity, and cross-cultural invariance in young people. *Psychology of Sport and Exercise*, 8, 632-653.
- Hagger, M. S., Chatzisarantis, N. L. D., Hein, V., Pihu, M., Soós, I., Karsai, I., . . . Leemans, S. 2009. Teacher, peer, and parent autonomy support in physical education and leisure-time physical activity: A trans-contextual model of motivation in four cultures. *Psychology and Health*, 24, 689-711.
- Hagger, M. S., & Hardcastle, S. J. 2014. Interpersonal style should be included in taxonomies of behaviour change techniques. *Frontiers in Psychology*, 5.
- Hagger, M. S., Lonsdale, A., Koka, A., Hein, V., Pasi, H., Lintunen, T., & Chatzisarantis, N. L. D. 2012. An intervention to reduce alcohol consumption in undergraduate students using implementation intentions and mental simulations: A cross-national study. *International Journal of Behavioral Medicine*, 19, 82-96.
- Hagger, M. S., Lonsdale, A. J., & Chatzisarantis, N. L. D. 2012. A theory-based intervention to reduce alcohol drinking in excess of guideline limits among undergraduate students. *British Journal of Health Psychology*, 17, 18-43.
- Hagger, M. S., & Luszczynska, A. 2014. Implementation intention and action planning Interventions in health contexts: State of the research and

- proposals for the way forward. *Applied Psychology: Health and Well-Being*, 6, 1-47.
- Hagger, M. S., Sultan, S., Hardcastle, S. J., Chatzisarantis, N. L. D., Duckworth, A. L., & Reeve, J. 2014. Applying the trans-contextual model to mathematics activities in the classroom and homework behaviour and attainment. Unpublished manuscript Perth, Australia: Curtin University.
- Hall, P. A. 2014. Re-establishing momentum in theory development: a commentary on Sniehotta, Pesseau and Araújo-Soares. *Health Psychology Review*, 1-4.
- Hall, P. A., & Fong, G. T. 2007. Temporal self-regulation theory: A model for individual health behavior. *Health Psychology Review*, 1, 6-52.
- Hall, P. A., & Fong, G. T. 2011. Temporal self-regulation theory: Looking forward. *Health Psychology Review*, 4, 83-92.
- Heckhausen, H., & Gollwitzer, P. M. 1987. Thought contents and cognitive functioning in motivational and volitional states of mind. *Motivation and Emotion*, 11, 101-120.
- Hein, V., & Koka, A. 2007. Perceived feedback and motivation in physical education and physical activity. In M. S. Hagger & N. L. D. Chatzisarantis (Eds.), *Intrinsic Motivation and Self-determination in Exercise and Sport* (pp. 127-140). Champaign, IL: Human Kinetics. doi:
- Hofmann, W., Friese, M., & Strack, F. 2009. Impulse and self-control from a dual-systems perspective. *Perspectives on Psychological Science*, 4, 162-176.
- Hofmann, W., Friese, M., & Wiers, R. W. 2008. Impulsive versus reflective influences on health behavior: A theoretical framework and empirical review. *Health Psychology Review*, 2, 111-137.
- Hofstede, G. 1983. The cultural relativity of organizational practices and theories. *Journal of International Business Studies*, 14, 75-89.
- Hollar, D., Lombardo, M., Lopez-Mitnik, G., Hollar, T. L., Almon, M., Agatston, A. S., & Messiah, S. E. 2010. Elective multi-level, multi-sector, school-based obesity prevention programming improves weight, blood pressure, and academic performance, especially among low-income, minority children. *Journal of Health Care for the Poor and Underserved* 21, 93-108.
- Houben, K. 2010. Learning to quit drinking: An impulsive and reflective route to behavioral change. *Psychologie & Gezondheid*, 38, 153-162.
- Houben, K., Havermans, R. C., & Wiers, R. W. 2010. Learning to dislike alcohol: conditioning negative implicit attitudes toward alcohol and its effect on drinking behavior. *Psychopharmacology*, 211, 79-86.
- Hoyt, A. L., Rhodes, R. E., Hausenblas, H. A., & Giacobbi, P. R., Jr. 2009. Integrating five-factor model facet-level traits with the theory of planned behavior and exercise. *Psychology of Sport & Exercise*, 10, 565-572.
- Hunter, J. E., & Schmidt, F. 1994. *Methods of meta-analysis: Correcting error and bias in research findings* (2nd ed.). Newbury Park, CA: Sage.

- Keatley, D. A., Clarke, D. D., & Hagger, M. S. 2012. Investigating the predictive validity of implicit and explicit measures of motivation on condom use, physical activity, and healthy eating. *Psychol, Health, 27*, 550-569.
- Keatley, D. A., Clarke, D. D., & Hagger, M. S. 2013. The predictive validity of implicit measures of self-determined motivation across health-related behaviours. *British Journal of Health Psychology, 18*, 2-17.
- Koka, A., & Hein, V. 2003. Perceptions of teacher's feedback and learning environment as components of motivation in physical education. *Psychology of Sport and Exercise, 4*, 333-346.
- Lam, S. 1999. Predicting intentions to conserve water from the theory of planned behavior, perceived moral obligation, and perceived water right. *Journal of Applied Social Psychology, 29*, 1058-1071.
- Lonsdale, A. J., Hardcastle, S. J., & Hagger, M. S. 2012. A minimum price per unit of alcohol: A focus group study to investigate public opinion concerning UK government proposals to introduce of new price controls to curb alcohol consumption. *BMC Public Health, 12*, 1023.
- Lowe, R., Eves, F. F., & Carroll, D. 2002. The influence of affective and instrumental beliefs on exercise intentions and behavior: A longitudinal analysis. *Journal of Applied Social Psychology, 32*, 1241-1252.
- Magnusson, K., Sigurgeirsson, I., Sveinsson, T., & Johannsson, E. 2011. Assessment of a two-year school-based physical activity intervention among 7-9-year-old children. *International Journal of Behavioral Nutrition and Physical Activity, 8*, 138.
- McEachan, R. R. C., Conner, M. T., Taylor, N., & Lawton, R. J. 2012. Prospective prediction of health-related behaviors with the Theory of Planned Behavior: A meta-analysis. *Health Psychology Review, 5*, 97-144.
- McLachlan, S., & Hagger, M. S. 2010. Effects of an autonomy-supportive intervention on tutor behaviors in a higher education context. *Teaching and Teacher Education, 26*, 1205-1211.
- Michie, S., Ashford, S., Sniehotta, F. F., Dombrowski, S. U., Bishop, A., & French, D. P. 2011. A refined taxonomy of behaviour change techniques to help people change their physical activity and healthy eating behaviours: The CALO-RE taxonomy. *Psychology & Health, 26*, 1479-1498.
- Michie, S., & Prestwich, A. 2010. Are interventions theory-based? Development of a theory coding scheme. *Health Psychology, 29*, 1-8.
- Milne, S. E., Orbell, S., & Sheeran, P. 2002. Combining motivational and volitional interventions to promote exercise participation: Protection motivation theory and implementation intentions. *British Journal of Health Psychology, 7*, 163-184.
- Mulaik, S. A., & Millsap, R. E. 2000. Doing the four-step right. *Structural Equation Modeling, 7*, 36-73.
- Mullan, E., Markland, D., & Ingledew, D. K. 1997. A graded conceptualisation of self-determination in the regulation of exercise behaviour: Development of a measure using confirmatory factor analysis. *Personality and Individual Differences, 23*, 745-752.

- Norman, P., Armitage, C. J., & Quigley, C. 2007. The theory of planned behavior and binge drinking: Assessing the impact of binge drinker prototypes. *Addictive Behaviors*, 32, 1753-1768.
- Ntoumanis, N. 2005. A prospective study of participation in optional school physical education based on self-determination theory. *Journal of Educational Psychology*, 97, 444-453.
- Ogden, J. 2003. Some problems with social cognition models: A pragmatic and conceptual basis. *Health Psychology*, 22, 424-428.
- Ogden, J. 2014. Time to retire the TPB?: One of us will have to go! A commentary on Sniehotta, Pesseau and Araújo-Soares. *Health Psychology Review*, Advance Online Publication.
- Ouellette, J. A., & Wood, W. 1998. Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin*, 124, 54-74.
- Pelletier, L. G., Dion, S. C., Slovinec-D'Angelo, M., & Reid, R. 2004. Why do you regulate what you eat? Relationships between forms of regulation, eating behaviors, sustained dietary behavior change, and psychological adjustment. *Motivation and Emotion*, 28, 245-277.
- Perugini, M. 2005. Predictive models of implicit and explicit attitudes. *British Journal of Social Psychology*, 44, 29-45
- Perugini, M., & Bagozzi, R. P. 2001. The role of desires and anticipated emotions in goal-directed behaviours: Broadening and deepening the theory of planned behavior. *British Journal of Social Psychology*, 40, 79-98.
- Perugini, M., & Bagozzi, R. P. 2004. The distinction between desires and intentions. *European Journal of Social Psychology*, 34, 69-84.
- Perugini, M., & Conner, M. 2000. Predicting and understanding behavioral volitions: The interplay between goals and behaviors. *European Journal of Social Psychology*, 30, 705-731.
- Phillips, P., Abraham, C., & Bond, R. 2003. Personality, cognition, and university students' examination performance. *European Journal of Personality*, 17, 435-448.
- Povey, R., Conner, M., Sparks, P., James, R., & Shepherd, R. 2000. Application of the Theory of Planned Behaviour to two dietary behaviours: Roles of perceived control and self-efficacy. *British Journal of Health Psychology*, 5, 121-139.
- Reeve, J. 2002. Self-determination theory applied to educational settings. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 183-203). Rochester, NY: University of Rochester Press. doi:
- Reeve, J., Bolt, E., & Cai, Y. 1999. Autonomy-supportive teachers: How they teach and motivate students. *Journal of Educational Psychology*, 91, 537-548.
- Reeve, J., & Jang, H. 2006. What teachers say and do to support students' autonomy during a learning activity. *Journal of Educational Psychology*, 98, 209-218.

- Rhodes, R. E. 2014. Will the new theories (and theoreticians!) please stand up? A commentary on Sniehotta, Penseau and Araújo-Soares. *Health Psychology Review*, 1-4.
- Rhodes, R. E., & Courneya, K. S. 2003. Relationships between personality, an extended theory of planned behaviour model and exercise behaviour. *British Journal of Health Psychology*, 8, 19-36.
- Rhodes, R. E., Courneya, K. S., & Jones, L. W. 2002. Personality, the theory of planned behavior, and exercise: A unique role for extroversion's activity facet. *Journal of Applied Social Psychology*, 32, 1721-1736.
- Rhodes, R. E., Courneya, K. S., & Jones, L. W. 2003. Translating exercise intentions into behavior: Personality and social cognitive correlates. *Journal of Health Psychology*, 8, 449-460.
- Rhodes, R. E., Plotnikoff, R., & Courneya, K. 2008. Predicting the physical activity intention-behavior profiles of adopters and maintainers using three social cognition models. *Annals of Behavioral Medicine*, 36, 244-252.
- Rivis, A., & Sheeran, P. 2003. Descriptive norms as an additional predictor in the theory of planned behaviour: A meta-analysis. *Current Psychology*, 22, 218-233.
- Rogers, R. W. 1975. A protection motivation theory of fear appeals and attitude change. *Journal of Psychology*, 91, 93-114.
- Rowland, T. 1990. Exercise and children's health. Champaign, Il: Human Kinetics.
- Ryan, R. M., & Connell, J. P. 1989. Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology*, 57, 749-761.
- Ryan, R. M., & Deci, E. L. 2000. The darker and brighter sides of human existence: Basic psychological needs as a unifying concept. *Psychological Inquiry*, 11, 319-338.
- Ryan, R. M., & Deci, E. L. 2007. Active human nature: Self-determination theory and the promotion and maintenance of sport, exercise, and health. In M. S. Hagger & N. L. D. Chatzisarantis (Eds.), *Intrinsic motivation and self-determination in exercise and sport* (pp. 1-20). Champaign, Il: Human Kinetics. doi:
- Sallis, J. F., & Patrick, K. 1994. Physical activity guidelines for adolescents: Consensus statement. *Pediatric Exercise Science*, 6, 302-314.
- Sallis, J. F., Simons-Morton, B., Stone, E., Corbin, C., Epstein, L., Faucette, N., . . . Taylor, W. 1992. Determinants of physical activity and interventions in youth. *Medicine and Science in Sports and Exercise*, 24 (Suppl.), S248-S257.
- Satorra, A., & Bentler, P. M. 1988. *Scaling corrections for statistics in covariance structure analysis*. Los Angeles, CA: University of California at Los Angeles, Department of Psychology.
- Schwarzer, R. 2008a. Modeling health behaviour change: How to predict and modify the adoption and maintenance of health behaviors. *Applied Psychology: An International Review*, 57, 1-29.

- Schwarzer, R. 2008b. Models of health behaviour change: Intention as mediator or stage as moderator? *Psychology and Health*, 23, 259-263.
- Schwarzer, R. 2014. Life and death of health behaviour theories. *Health Psychology Review*, 8, 53-56.
- Schwarzer, R. 2014. Some retirees remain active: a commentary on Sniehotta, Presseau and Araújo-Soares. *Health Psychology Review*, 1-3.
- Schwarzer, R., Lippke, S., & Ziegelmann, J. P. 2008. Health action process approach - A research agenda at the Freie Universität Berlin to examine and promote health behavior change. *Zeitschrift Fur Gesundheitspsychologie*, 16, 157-160.
- Sheeran, P. 2002. Intention-behavior relations: A conceptual and empirical review. In W. Stroebe & M. Hewstone (Eds.), *European Review of Social Psychology* (pp. 1-36). London: Wiley. doi:
- Sheeran, P., & Orbell, S. 1999. Augmenting the Theory of Planned Behavior: Roles for anticipated regret and descriptive norms. *Journal of Applied Social Psychology*, 29, 2107-2142.
- Sheeran, P., & Orbell, S. 2000. Self schemas and the theory of planned behaviour. *European Journal of Social Psychology*, 30, 533-550.
- Sheeran, P., Orbell, S., & Trafimow, D. 1999. Does the temporal stability of behavioral intentions moderate intention-behavior and past behavior-future behavior relations? *Personality and Social Psychology Bulletin*, 25, 721-730.
- Sheeran, P., Trafimow, D., Finlay, K. A., & Norman, P. 2002. Evidence that the type of person affects the strength of the perceived behavioural control-intention relationship. *British Journal of Social Psychology*, 41, 253-270.
- Sheldon, K. M., Elliot, A. J., Kim, Y., & Kasser, T. 2001. What is satisfying about satisfying events? Testing 10 candidate psychological needs. *Journal of Personality and Social Psychology*, 80, 325-339.
- Simons-Morton, B. G., O'Hara, N. M., Simons-Morton, D. G., & Parcel, G. S. 1988. Health related physical fitness in childhood: Status and recommendations. *Annual Review of Public Health*, 9, 403-425.
- Sleap, M., & Warburton, P. 1992. Physical activity levels of 5-11 year-old children in England as determined by continuous observation. *Research Quarterly for Exercise and Sport*, 63, 238-245.
- Sniehotta, F. F., Presseau, J., & Araújo-Soares, V. 2014. Time to retire the Theory of Planned Behaviour. *Health Psychology Review*, 8, 1-7.
- Sniehotta, F. F., Scholz, U., & Schwarzer, R. 2005. Bridging the intention-behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychology and Health*, 20, 143-160.
- Standage, M., Duda, J. L., & Ntoumanis, N. 2005. A test of self-determination theory in school physical education. *British Journal of Educational Psychology*, 75, 411-433.
- Standage, M., Gillison, F. B., & Treasure, D. C. 2007. Self-determination and motivation in physical education. In M. S. Hagger & N. L. D.

- Chatzisarantis (Eds.), *Intrinsic Motivation and Self-Determination in Exercise and Sport* (pp. 71-85). Champaign, IL: Human Kinetics. doi:
- Strack, F., & Deutsch, R. 2004. Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review*, 8, 220-247.
- Sutton, S. 1994. The past predicts the future: Interpreting behaviour-behaviour relationships in social psychological models of health behaviour. In D. R. Rutter & L. Quine (Eds.), *Social Psychology and Health: European Perspectives* (pp. 71-88). Aldershot, UK: Avebury. doi:
- Symons Downs, D., & Hausenblas, H. A. 2005. The theories of reasoned action and planned behavior applied to exercise: A meta-analytic update. *Journal of Physical Activity and Health*, 2, 76-97.
- Taylor, I., & Ntoumanis, N. 2007. Teacher motivational strategies and student self-determination in physical education. *Journal of Educational Psychology*, 99, 747-760.
- Terry, D. J., Hogg, M. A., & White, K. M. 2000. Attitude-behavior relations: Social identity and group membership. In D. J. Terry & M. A. Hogg (Eds.), *Attitudes, behavior, and social context: The role of norms and group membership* (pp. 67-93). Mahwah, NJ: Erlbaum. doi:
- Terry, D. J., & O'Leary, J. E. 1995. The Theory of Planned Behaviour: The effects of perceived behavioural control and self-efficacy. *British Journal of Social Psychology*, 34, 199-220.
- Trafimow, D. 2004. Problems with change in R2 as applied to theory of reasoned action research. *British Journal of Social Psychology*, 43, 515-530.
- Trafimow, D. 2014. On retiring the TRA/TPB without retiring the lessons learned: a commentary on Sniehotta, Penseau and Araújo-Soares. *Health Psychology Review*, 1-4.
- Trafimow, D., & Finlay, K. A. 1996. The importance of subjective norms for a minority of people: Between-subjects and within-subjects effects. *Personality and Social Psychology Bulletin*, 22, 820-828.
- Trafimow, D., & Sheeran, P. 1998. Some tests of the distinction between cognitive and affective beliefs. *Journal of Experimental Social Psychology*, 34, 378-397.
- Vallerand, R. J. 1997. Towards a hierarchical model of intrinsic and extrinsic motivation. *Advances in Experimental Social Psychology*, 29, 271-359.
- Vallerand, R. J. 2000. Deci and Ryan's Self-Determination Theory: A view from the hierarchical model of intrinsic and extrinsic motivation. *Psychological Inquiry*, 11, 312-318.
- Vallerand, R. J. 2007. A hierarchical model of intrinsic and extrinsic motivation for sport and physical activity. In M. S. Hagger & N. L. D. Chatzisarantis (Eds.), *Intrinsic Motivation and Self-Determination in Exercise and Sport* (pp. 255-279). Champaign, IL: Human Kinetics. doi:
- Vallerand, R. J., & Ratelle, C. 2002. Intrinsic and extrinsic motivation: A hierarchical model. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-*

- determination research (pp. 37-63). Rochester, NY: University of Rochester Press. doi:
- Van Hooft, E. A. J., & De Jong, M. 2009. Predicting job seeking for temporary employment using the theory of planned behaviour: The moderating role of individualism and collectivism. *Journal of Occupational and Organizational Psychology*, 82, 295-316.
- Vansteenkiste, M., Simons, J., Soenens, B., & Lens, W. 2004. How to become a persevering exerciser? Providing a clear, future intrinsic goal in an autonomy-supportive way. *Journal of Sport and Exercise Psychology*, 26, 232-249.
- Verplanken, B., Aarts, H., & van Knippenberg, A. 1997. Habit, information acquisition, and the process of making travel mode choices. *European Journal of Social Psychology*, 27, 539-560.
- Verplanken, B., Hofstee, G., & Janssen, H. 1998. Accessibility of affective versus cognitive components of attitudes. *European Journal of Social Psychology*, 28, 23-35.
- Vincent, S. D., & Pangrazi, R. P. 2002. An examination of the activity patterns of elementary school children. *Pediatric Exercise Science*, 14, 432-441.
- Viswesvaran, C., & Ones, D. S. 1995. Theory testing: Combining psychometric meta-analysis and structural equations modeling. *Personnel Psychology*, 48, 865-886.
- Walker, G. J., Courneya, K. S., & Deng, J. 2006. Ethnicity, gender, and the Theory of Planned Behavior: The case of playing the lottery. *Journal of Leisure Research*, 38, 224-248.
- White, K. M., Hogg, M. A., & Terry, D. J. 2002. Improving attitude-behavior correspondence through exposure to normative support from a salient ingroup. *Basic and Applied Social Psychology*, 24, 91-103.
- Williams, G. C. 2002. Improving patients' health through supporting the autonomy of patients and providers. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 233-254). Rochester, NY: University of Rochester Press. doi:
- Williams, G. C., Cox, E. M., Kouides, R., & Deci, E. L. 1999. Presenting the facts about smoking to adolescents: The effects of an autonomy supportive style. *Archives of Pediatrics and Adolescent Medicine*, 153, 959-964.
- Wilson, P. M., & Rodgers, W. M. 2004. The relationship between perceived autonomy support, exercise regulations and behavioral intentions in women. *Psychology of Sport and Exercise*, 5, 229-242.
- Wilson, P. M., & Rodgers, W. M. 2007. Self-determination theory, exercise and well-being. In M. S. Hagger & N. L. D. Chatzisarantis (Eds.), *Intrinsic Motivation and Self-determination in Exercise and Sport* (pp. 101-112). Champaign, IL: Human Kinetics. doi: