

Introduction

Although the benefits of a physically active lifestyle are well documented, globally 81% of adolescents and 27.5% of adults currently do not meet WHO's recommended levels of daily physical activity (PA) (WHO, 2018). This has negative repercussions on individuals' health and causes economic burdens. If current trends of physical inactivity continue, it is estimated that globally there will be close to 500 million new cases of preventable non communicable diseases between 2020-2030, amounting to treatment costs of \$27 billion annually (WHO, 2022). In response to this, WHO (2018) have produced a global action plan to promote PA worldwide and the promotion of PA among adolescents has become a national priority in several countries (Guthold et al., 2018). Physical education (PE) has been identified as a valuable network through which interventions to increase regular PA can be delivered to children and adolescents (Cooper et al., 2016). While school PE aims to provide opportunities to be active during the school day and develop physical competence, it can also provide opportunities to develop the knowledge, skills, and motivation to be physically active outside of school and throughout life (Bailey and Dismore, 2006; Fairclough et al., 2002; Cohen et al., 2015; Gu and Solomon, 2016; Jaakkola et al., 2013; Lonsdale et al., 2017; Shen, 2014). Indeed, the potential and hope for PE to influence lifelong PA engagement is reflected in curricula that have placed the concept of physical literacy (PL) as a central outcome (Australian Sport Commission, 2020; Society of Health and Physical Educators America, 2024; United Nations Educational, Scientific and Cultural Organization, 2015). While there are many reasons why people may or may not engage in PA, this essay seeks to evaluate motivational theories and theory-informed interventions and to illustrate the central role motivation can play in the promotion of PA and its associated health benefits in the adolescent population. First, PE and PA will be defined and differentiated. This will be followed by a definition of motivation and how motivational theories propose to influence people's behaviour. The next two sections will evaluate Self Determination Theory (SDT) (Deci and Ryan, 1985; Ryan and Deci, 2000, 2017) and the Transcontextual Model (TCM) (Hagger and Chatzisarantis, 2003) and the evidence for their practical effectiveness in the contexts of PE and leisure-time physical activity (LTPA). PA is understood as any bodily movement that results in energy expenditure (Caspersen et al., 1985). This essay will refer to the context of

LTPA, where PA is chosen at will during a time of free choice. On the other hand, PE is a required school subject aimed at building learners' physical ability to move and to learn through movement (Association for Physical Education, 2020). Motivation has been defined as the “process that influences the initiation, direction, magnitude, perseverance, continuation, and quality of goal-directed behaviour” (Maehr and Zusho, 2009, p.77). Social psychological theories and models have informed many of the behavioural approaches used to understand people’s motivation towards PA. In utilising the theories, researchers seek to identify motivational correlates and antecedents of PA behaviour; identify processes by which these correlates affect PA; and use the knowledge gained to inform intervention design aimed at promoting positive health outcomes (Littlecott, Moore, Moore, and Murphy, 2014). As observed by Cook and Artino Jnr (2014), the modern theories share some similar conceptual ideas. These are the idea of competence someone holds ; the idea of the value of the task or anticipated result; the idea of attribution whereby learners consciously or unconsciously establish links between the outcome and causes of the outcome. If these causes are perceived to be changeable and within control, learners will persist in future attempts. Lastly, there is a cognitive concept included in the theories. The learners go through unobservable mental processes. The more recent theories also recognise that there is an interplay between the self, others and the environment and motivation cannot be fully explained on a solely individual level.

Self Determination Theory

SDT (Deci and Ryan, 1985; Ryan and Deci, 2000, 2017) hypothesises how motivation arises and impacts people's behaviour and well-being. It is a meta-theory, made up of six mini-theories that come together to offer an understanding of human motivation and behaviour. This section will focus on Basic Psychological Needs Theory (BPNT) and Organismic Integration Theory (OIT). Central to SDT is the continuum of motivational quality. Going beyond the binary notion of intrinsic and extrinsic motivation, OIT describes different forms of controlled and autonomous motivation. These range from amotivation to intrinsic motivation. Between these lie four types of extrinsic motivation which vary in their degree of autonomy. The more autonomous forms of extrinsic motivation are identified regulation and integrated regulation. The embedded BPNT hypothesises a route to more autonomous forms of

motivation. BPNT postulates that for optimal wellness and psychological functioning to develop, three fundamental needs must be supported and satisfied (Deci and Ryan, 2000). These are autonomy, the need to feel a sense of willingness and self-origin for one's actions; competence, the need to feel effective in one's interactions with the world; and relatedness, the need to feel understood, connected and cared for by others (Ryan and Deci, 2017). When these needs are met, there can be an active transformation of controlled forms of regulation into more autonomous forms through the process of internalisation. Whereas, when these needs are frustrated or thwarted, people are more likely to regulate their actions and behaviours for controlled reasons or motivations. (McDavid, Cox, and McDonough, 2014; Mouratidis, Barkoukis, and Tsorbatzoudis, 2015; Ntoumanis, 2001; Standage et al., 2005). The extent to which people feel in control of their actions and feel autonomous will determine their persistence with the behaviour. Those acting for autonomous reasons are more likely to persist in the absence of external rewards/contingencies (Chatzisarantis, Biddle and Meek, 1997; Chatzisarantis et al., 2003; Fortier and Kowal, 2007; Hagger, 2019; Ng et al., 2012; Pelletier et al., 2001). Therefore, of interest to researchers is the promotion of autonomous forms of motivation to engage people in persistent PA over time.

SDT Research Findings

SDT informed interventions have shown effectiveness in increasing positive outcomes in school PE through autonomy supportive environments and teaching practices (Vasconcellos et al., 2019; White et al., 2021). The more autonomously motivated individuals are, the more adaptive their behavioural and health outcomes have been shown to be (Ng et al., 2012; Teixeira et al., 2012). It then theoretically follows that, in practice, a needs supportive environment has the potential to promote more autonomous forms of motivation and subsequently more positive outcomes in PE. This has been strongly supported in a systematic review and meta-analysis of 256 studies on the effect of SDT practices in PE (Vasconcellos et al., 2019), which found that the relationships between need satisfaction and types of motivation and between types of motivation and positive outcomes in PE aligned with the theory. Notably, need satisfaction was strongly correlated to autonomous motivation and positively correlated to introjected motivation. In turn, autonomous motivation was

positively correlated with adaptive outcomes in PE such as enjoyment and PA intentions and negatively correlated with maladaptive outcomes. Introjected regulation was modestly correlated with both adaptive and maladaptive outcomes (Vasconcellos et al., 2019). The key strength of this review is being the first to conduct a quantitative meta-analysis on the extensive collection of SDT research in the context of PE. One limitation is the use of self-report measures in many of the studies, which rely on individuals' awareness of their own psychological state and can be skewed by social desirability (Toure-Tillery and Fishbach, 2014). While it is noted that most of the studies in the analysis examined the teacher's role in providing competence support in PE, research into teachers' motivating styles in general education has predominantly focussed on supporting the need for autonomy (Reeve and Cheon, 2021). In general education settings, Reeve (2009) states that pupils will feel a sense of autonomy when they are in an environment where they can complete work without feeling pressurised. Therefore, it is important for the teacher to create an environment where students feel comfortable expressing their thoughts, emotions, and behaviours. More specifically in PE, an experimental study involving 1,158 PE students, found that students with more autonomy-supportive teachers outperformed their peers academically and demonstrated improvements in skill development, classroom engagement, autonomous motivation, and future exercise intentions (Cheon, Reeve and Moon, 2012). Moreover, autonomy need satisfaction is associated with increased PA levels (Lonsdale et al., 2017). These are clearly desirable outcomes and research has led to the development of seven empirically tested autonomy supportive behaviours for teachers in general education, which can be applied in PE settings (Reeve and Cheon, 2021). For example, using invitational language and offering choice have both proven effective in improving outcomes in PE, with perceptions of personal and approachable teachers resulting in more positive emotions towards PE (White et al., 2021) and those with choices placing more value on PA (Standage, Duda and Ntoumanis, 2003). , and increasing overall levels of PA during lessons (Lonsdale et al., 2009; Lonsdale et al., 2013). Teacher behaviour has also been shown to have an impact on the perceived support for competence. In PE, an empirical study with 1,692 Spanish students found that competence support from the teacher predicted students' autonomous motivation, which in turn predicted students' enjoyment, perceived importance of PE, and plans to do more PA outside of school (Sanchez-Oliva et al., 2014). Cheon, Reeve and

Vansteenkiste (2020) examined past research to identify teacher behaviours that can support competence to aim for these positive outcomes. In providing structure for competence support, the teacher establishes clear expectations (Cheon, Reeve, and Song, 2019); defines competent functioning (Grolnick and Pomerantz, 2009); offers step-by-step guidance for progress (Vansteenkiste et al., 2012); provides support and assistance (Jang et al., 2010); monitors and adjusts task difficulty (Belmont et al., 1988) and gives informational, constructive feedback (Carpentier and Mageau, 2016; Mouratidis et al., 2008). Providing such instruction enables students to feel more confident and satisfied with their abilities, which in turn motivates them to actively participate in class, improve their skills, perform well, and use advanced learning strategies (Aelterman et al., 2019; Carpentier and Mageau, 2013; Mouratidis et al., 2013; Vansteenkiste et al., 2012). Moreover, the construct of competence has been conceptualised and studied for effectiveness in other theories. In the theory of self-efficacy (Bandura, 1997), where individuals' perception of their ability to behave with a certain proficiency fluctuates with task demands, changes in self-efficacy have been strongly associated with changes in PA (Williams and French, 2011) and found to be a correlate of PA in young people (Biddle et al., 2011). Past experiences inform perception of self-efficacy and failure undermines self-efficacy (Bandura, 1997; Gilson and Feltz, 2012). This may have a future effect on PA intentions and engagement as past experiences may theoretically inform affective states in the conscious and nonconscious decision to engage in PA (Brand and Ekkekakis, 2017; Rebar et al., 2016). Additional evidence for competence support leading to more quality motivation and therefore more positive outcomes can be found in research on achievement goal theory (AGT) (Nicholls, 1989; Elliot, 1999). A performance climate, whereby success is measured by reference to others, is associated with need frustration, boredom and amotivation to partake (Garcia-Gonzalez et al., 2019). Alternatively, a mastery climate, in which success is self-referenced, is associated with need satisfaction, autonomous motivation and a greater intention to engage in PA (Di Battista et al., 2018). Regarding the need for relatedness, research has shown teaching methods that promote a sense of connection and belonging in PE classes are associated with improved student engagement in the classroom (Gairns, Whipp and Jackson, 2015), higher levels of self-determined motivation and increased participation in PA during leisure time (Jackson et al., 2013). However, quantitative meta-analysis showed peer support, rather than teacher support was

more strongly related to the satisfaction of relatedness (Vasconcellos et al., 2019). This relation has found further support in a meta-analysis of qualitative studies (White et al., 2021), where findings have suggested that peers may be the most crucial social aspect in the PE environment with supportive peer relationships associated with relatedness satisfaction, intrinsic motivation and positive affect. They can also thwart the need through teasing, dominating games and making comparisons (Vasconcellos et al., 2019; White et al., 2021). Since the research demonstrates increased motivation in those who receive emotional support from both teachers and peers (Wentzel et al., 2017), it is essential to deepen understanding of the role of peer support for relatedness in future research. Overall, studies of SDT in the context of school PE demonstrate the potential of this motivational theory to enhance autonomous motivation and lead to more PA. However, teaching approaches and interventions for SDT tend to be drawn from a range of sources. The development of defined teaching strategies in PE, such as the 21 techniques to support basic psychological needs (Teixiera et al., 2020), could provide future studies with a more consistent approach and allow for clearer synthesis of results. This section has focussed on motivation and PA within the context of PE. As previously discussed, a goal for PE is to provide the competence, motivation, skills and knowledge to continue to be active throughout life, beyond the classroom. The next section will evaluate a theory that hypothesises how PA motivation may transfer from the PE domain to out of school, freely chosen PA.

Transcontextual Model of Autonomous Motivation

There are growing concerns about health issues arising from physical inactivity in young people such as obesity and increased risk of cardiovascular disease at school age (Carson et al., 2016; Kurdaningsih et al., 2016). Additionally, research links low PA levels with depressive symptoms, psychological discomfort, low self-esteem, hyperactivity, attention issues, anti-social behaviour, and reduced psychological well-being and quality of life (Carson et al., 2016; Hoare et al., 2016; Suchert et al., 2015). Despite this, a systematic review notes decreases in PA as children move into adolescence (Chong et al., 2020) and research suggests that PA in this age group tends to decline with age (Farooq et al., 2018). Indeed, globally, most adolescents do not meet PA guidelines (WHO, 2018). Since school has been

recognised as a potential platform to motivated and promote PA among young people, researchers have tried to identify factors determining PA in the classroom (Standage, Duda and Ntoumanis, 2003) and in out of school contexts (Plotnikoff et al., 2013). One model for examining these factors is the Transcontextual Model (TCM) (Hagger et al., 2003). TCM is a multi-theory model which integrates three social psychology theories to explain the process by which autonomous motivation for PA in a PE context may be transferred into autonomous motivation for, intention towards, and actual engagement in LTPA (Hagger and Chatzisarantis, 2016). TCM has three propositions, which are derived from SDT (Deci and Ryan, 1985; Ryan and Deci, 2000, 2017), the theory of planned behaviour (TPB)(Ajzen,1985; 1991) and the hierarchical model of intrinsic and extrinsic motivation (Vallerand, 2007). The first proposition, drawing from SDT, is that students who perceive their PE teacher to be autonomy supporting, will be autonomously motivated towards PA in the PE context. The second proposition is that those who are autonomously motivated towards PA in the PE context will, in turn, be autonomously motivated towards PA in leisure time. This transfer of motivation is proposed to occur through two mechanisms. The hierarchical model hypothesises that those who are autonomously motivated towards a specific behaviour one context, are more likely to seek out similar behaviours in a different context. This is underpinned by SDT whereby the satisfaction of basic needs leads to internalisation of the behaviour as one that fosters autonomous motivation and will be more likely sought out in the future. The third proposition is that autonomous motivation towards LTPA predicts future intention to engage in, and actual engagement in LTPA. The model uses the decision-making process outlined in TPB which hypothesises that the belief-based constructs of attitude, subjective norms, and perceived behavioural control effect behaviour, mediated by intention.

TCM Research Findings

Initial testing of the model found support for all three propositions through three three-wave prospective studies and a meta-analysis, which indicated significance between key relationships in the model (Hagger and Chatzisarantis, 2003).

Limitations including sample size and self-report measures were reported along with the fact that all studies originated from the same group of researchers, which risks

bias. Interestingly, the researchers also noted the importance of the omission of alternative sources of support for perceived autonomy other than the teacher from the model. The model was augmented to include provision for measuring perceived autonomy support from peers and parents. It was found that perceived autonomy support from peers and parents had significant effects on autonomous motivation in LTPA (Hagger and Chatzisarantis, 2003). A later meta-analysis (Hagger and Chatzisarantis, 2016) provided further evidence for the hypothesised relations in the model but, again, small sample sizes were noted as a limitation and the researchers observed heterogeneity in results, possibly due to other extraneous variables. It was speculated that these may demographic factors such as nationality, gender or age, or sample-level differences in behaviour type or psychological factors such as general causality orientations (Deci and Ryan, 1985; Hagger and Chatzisarantis, 2011). Overall, research has supported predictions of the TCM in multiple samples in different contexts and across different nationalities (Chan, Hagger, and

Spray, 2011; González-Cutre et al., 2014; Hagger and Chatzisarantis, 2016; Hagger et al., 2015). Intervention research has also indicated that when PE teachers or social agents provide autonomy support, it affects LTPA through the mediation of the model variables (Chatzisarantis and Hagger, 2009; Mavropoulou et al., 2018; Wallhead, Hagger and Smith, 2010). However, while two recent studies found effects of perceived autonomy support in PE on autonomous motivation in PE and, in turn, trans-contextual transfer of this autonomous motivation to LT, neither found support for increases in actual LTPA (Schneider et al., 2020; Kalajas-Tilga et al., 2021). In one study, the potential explanation is that the students' perceived autonomy support and actual LTPA were already high at baseline, meaning room for increase was limited (Schneider et al., 2020). Indeed, research suggests the idea of designing interventions identifying specific needs and deficits within the target group (Hankonen and Hardeman, 2020). In the other one-year longitudinal study, COVID-19 restrictions were enforced, which likely explains the negative relation found between intentions towards LTPA and actual PA levels (Kalajas-Tilga et al., 2021). Otherwise, this study supported the main propositions of TCM, while accounting for change in individual constructs over time. Further longitudinal studies, with larger sample sizes recruited from both male and female adolescent populations are needed to build the evidence base and to find causal connections through

manipulation of key constructs within the model. The potential for developing augmented models, which consider socio-ecological factors could be of interest in uncovering more determinants of LTPA in the adolescent population as research into these areas points to the numerous other variables that could be influencing behaviour. For example, access to facilities, the walking distance from home to school. (Hunter et al., 2020; Zhang et al., 2019; Godin et al., 2010; Hagger and Hamilton, 2020). Specifically in Scotland, where there are positive environmental influences and favourable policy for PA (Bardid et al., 2022), Scotland ranked last among 38 nations for physically active adolescents (Active Healthy Kids Report Card, 2021). This also leads to questions about the strength of different determinants. Although it is beyond the scope of this essay, the role of nonconscious factors, which affect actions beyond an individual's awareness, are being increasingly recognised in health behaviour change. Another possible avenue for deeper understanding of the motivational processes in TCM would be the integration of constructs representing non-conscious processes such as implicit attitudes and habits (Strack and Deutsch, 2004). This may offer further insight and more comprehensive predictions about actual LTPA in TCM. Overall, the tenets of TCM stand supported in the extant studies. Future TCM based interventions designed to transfer motivation from the classroom to LTPA will rely on teacher training to support perceived autonomy support in PE. As mentioned earlier, these SDT informed supportive behaviours are currently drawn from a range of sources so there is a need to specify strategies and, perhaps, tailor strategies to specific needs in the class. TCM has allowed researchers to establish a relationship between in class motivation and LTPA motivation, providing crucial information in the promotion of PA, which evidence suggests tracks into adulthood (Telama et al., 2014).

Conclusion

This essay sought to evaluate the motivational theory of SDT in the context of school PE. A larger goal of school PE is to equip individuals with the physical competence, skills, knowledge and motivation to lead a physically active lifelong term. Given that more autonomous motivation is associated with more persistent behaviour, it is crucial that motivational processes are understood. SDT has provided a valuable

framework for explaining how autonomous motivation for PA may be promoted through the support and satisfaction of three basic psychological needs. Research studies on SDT have provided strong evidence for the hypothesis that needs satisfaction can lead to more autonomous motivation and engagement in PA, which has informed recommended teaching behaviours. Going forward, it is important that these behaviours and strategies for PE teaching are defined and implemented by teachers trained in needs supportive methods. The influence of peers within needs supportive environments was highlighted and suggested as a target for future programmes or interventions. Considering that the recommended levels of PA for adolescents (WHO, 2020) far exceeds the allotted time for PE, it is vital that motivation for LTPA is understood. The next section turned to TCM, wherein autonomous motivation from PE is proposed to transfer to LTPA. Again, there is strong evidence to support some of the key propositions in the model. Namely that perceived autonomy support in PE predicts autonomous motivation in PE and that autonomous motivation in PE predicts autonomous motivation in LTPA. While there were inconsistent findings for other relations in the model, it nonetheless offers a valuable insight into transfer of motivation from one context to another. Further larger scale studies, along with exploration of model extensions or integrations could offer even deeper understanding of these processes and allow the PE teacher to have a far-reaching impact on adolescent PA levels. Understanding and utilising motivational processes equips us with a vital tool in the fight against physical inactivity.

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