

Depressive and Psychosomatic Symptoms in Twins With Special Reference to Co-Twin Dependence

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We analyzed depressive and psychosomatic symptoms in relation to co-twin dependence in 419 twins at the age of 22 to 30 years. Depressive symptoms were assessed, as previously, with Children's Depression Inventory modified to be suitable for this age and reported as a total score and three subscales (low self-confidence, anhedonia and sadness) based on factor analysis as reported in a previous epidemiological study conducted in Finland. Items assessing nervous complaints and somatic symptoms were adapted from Finnish studies of juvenile health habits. Inter-twin dependence decreased with increasing age in both genders. Monozygotic twins, especially monozygotic females, reported most often to be dependent on their co-twin. When the symptom reporting was evaluated in relation to co-twin dependence, no relation was found between co-twin dependence and depressive symptom reporting. However, dependence-independence imbalance within twin pair was associated with elevated levels of depressive and psychosomatic symptoms, especially in twins who perceived themselves as dependent and the co-twin as independent. We conclude that there was no relation found between co-twin dependence and depressive symptom reporting in male and female twins except for the few imbalance cases, where most symptoms were reported by those dependent twins who felt their co-twin as independent.

Keywords: co-twin dependence, depressiveness, psychosomatic symptoms

The sibling bond is the longest lasting relationship for most people. It is a relationship with the potential to provide intimacy and social support as well as to influence the development of social and cognitive skills. Twin relationship creates a special type of sibling relationship. While the twinship may be the closest relationship possible between two people, it may also create a developmentally challenging situation (Siemon, 1980). The important thing is how the

closest persons around the twins, such as the parents, and the twins themselves adapt to the situation.

The development of interpersonal relationships in twins has some special features of its own. The close twin relationship has been called by names such as co-twin dependence, couple effect, twinning bond and twinning reaction (Joseph & Tabor, 1961).

Many studies indicate that twins are asymmetrical in their relationship and enact complementary roles relative to one another (Ainslie, 1985; Robin et al., 1988; Schave & Ciriello, 1983). This asymmetry is implicit in the dominance–submissiveness between twins (Lytton, 1980; Moilanen, 1987). This feature can be seen in three different areas of life: *physical* and *psychic* dominans and the *role of spokesman* (Tienari, 1966). By conquering different areas of expertise, twin siblings can avoid conflict and enhance mutual cooperation. The term ‘complementary’ is often used to describe a twin pair, the members of which have consciously or unconsciously developed different and even opposite features (Ainslie, 1985; Schave & Ciriello, 1983). Split roles can also help twins to develop their sense of self as separate individuals from the co-twin by having certain distinguishing characteristics. Another issue is the ability of twins to deal with the comparisons made between them and to shift from possible competition to cooperation or other constructive forms of interaction. By assuming complementary roles twins may make up a well-functioning unit, and this resolution helps them to avoid competing in the same field.

Many factors will affect how the twin relationship develops, and the extent to which each twin within the relationship develops a companionable rather than a narcissistic relationship with the other twin. The presence of the other twin leads to a situation in which mother and twins create a triad, rather than the dyadic relationship that exists for singletons. Mother is less

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available to each twin than she would be to a single baby. Whenever mother relates to one twin, the other would be at least partially excluded. It has been suggested that a more limited amount of mothering leads to closer bonding between the twins (Leonard, 1961; Schave & Ciriello, 1983), and the existence of a twin may sometimes ameliorate developmental difficulties in situations of maternal unavailability or neglect. On the other hand, the findings by Vandell et al. (1988) in observations of young twin infants between 6 and 24 months did not support these kinds of assumptions. The twins were more likely to interact with each other if both twins were securely attached to the mother than if one or both twins were insecurely attached.

As the person who is most constantly present within the twin's range of perception is his/her co-twin, a twin easily identifies with his/her co-twin. Each twin goes through the same developmental processes as singly born infants, including separation from the parents and individuation. Each twin also has an additional task, that of separating himself from his co-twin in order to grow up to be an autonomous individual.

Leonard (1961) defined four factors that influence mutual identification in twins. These factors are (1) cultural attitude toward twins, (2) parental attitude, (3) physical similarity of the twins and (4) socioeconomic situation. The four factors provide a combination of circumstances, all of which may serve to emphasize intertwin identification

Winestine (1969) introduced the concept of twinship in his study of psychological individuation of twins. He arrived at four indicators of 'twinning', also defined as partial fusion of self and object representation: (1) self-image of being part of a whole, (2) inability to form object relationships with peers or view oneself as a discrete object choice for peers apart from the co-twin, (3) difficulty in tolerating separation from the co-twin and differences in personality and (4) interests evolving as a reaction to the other twin rather than by individual positive identification. Winestine suggested that the presence of all these indications signify poor individuation in twins and an increased risk of developing a psychic disease.

It has been suggested that separation from the co-twin can be more problematic than separation from mother as the twinship offers a narcissistic refuge that lacks generational difference (Lewin, 2009). The drive toward separating may be opposed by the gratification of the dependency that twins experience with each other (Joseph & Tabor, 1961). At times when frustration may be difficult to tolerate, twins may, to varying degrees, seek from each other some form of gratification, using the other twin, either in fantasy or physically, thus avoiding the space that is necessary for the development of symbolic thought (Lewin, 2009). On the other hand, in their search for individuality twins may create differences, sometimes even artificial ones, between themselves (Schave & Ciriello, 1983) by accentuating slight differences in behavioral contin-

uums; for example, one twin is more dominant while the other is more submissive (Segal, 1999). Problems may occur if the process of individualization is not successful and one or both twins continue to identify themselves by their twinship.

An excess of interpersonal dependence has been associated with a vulnerability to several psychiatric disorders, most notably major depression (Bornstein, 1992; Sanathara et al., 2003). In this study our aim was to evaluate self-reported co-twin dependence in relation to psychosomatic and depressive symptoms in young adult twins. These analyses were performed separately in males and females. Moreover, as twinship has been suggested to constitute a different growing environment for same-sex (SS) and opposite-sex (OS) twin pairs as well as for monozygotic (MZ) and dizygotic (DZ) twin pairs (Allen et al., 1976; Ebeling et al., 2003; Pulkkinen et al., 2003), we evaluated the differences in symptom reporting between different twin pairs and in different zygosity groups.

Material and Methods

The original study group was made up of all 335 twin deliveries in Oulu University Hospital during the years 1965–1973 (Koivisto et al., 1975). The twins have been followed at 10-year intervals: at 2–10 years, 12–20 years and now at 22–30 years of age. The data collection has been described in detail previously (Ebeling et al., 2003).

The zygosity determination was based on similarity questions, answered by the twins at 22–30 years of age, concerning ages before, at and after school age, and on similarity examination at the age of 2–10 years in connection with paediatric examination to one third of the twins. The zygosity determination has been described in detail previously (Trias et al., 2006).

In the present study phase 419 twins returned the questionnaire. There were 201 males and 218 females, 184 complete twin pairs. According to zygosity determination there were 32 monozygotic males (MZM), 63 same-sex dizygotic males (SSDZM), 78 opposite-sex dizygotic males (OSDZM), 32 monozygotic females (MZF), 52 same-sex dizygotic females (SSDZF) and 87 opposite-sex dizygotic females (OSDZF), while 75 fell in the group of unclassified because of discrepancy in similarity questions and of not having had the paediatric examination at age 2–10.

At the present investigation, which was carried out in 1995, when the twins were 22–30 years old, they completed questionnaires about inter-twin and parent–twin relationships and mental wellbeing.

Co-twin dependence was inquired about now as young adults as well as retrospectively, concerning age before school and school age, which in Finland includes the years from 7 to 16 (compulsory school age), or to 19 (upper secondary school). The twins answered the question: 'In your opinion were/are you dependent on your co-twin?' with the response alternatives *Yes* and *No*.

Two measures of pair-wise dependence were included as in a previous study by Penninkilampi-Kerola (2006). The first, 'pair-wise dependence' was formed on the basis of the responses of each individual twin to the question 'In your opinion are you dependent on your co-twin?' Twin pairs were classified into three categories: (1) *Concordantly Dependent* (both twins of a pair reported themselves dependent; $n = 8$ twin individuals, 4.6%), (2) *Concordantly Independent* (both twins of a pair reported being independent; $n = 142$ twin individuals, 81.6%), and (3) *Discordantly Dependent* (one twin of a twin pair reported dependence and the co-twin reported independence; $n = 24$ twin individuals, 13.8%).

The second measure of pair-wise dependence reflected each individual twin's subjective perception of the dependence within the twin pair. This measure was labeled as 'Individual-based perception of pair-wise dependence' in order to distinguish it from the first measure of pair-wise dependence. Twins were assigned to four groups based on each individual twin's report of his/her and the co-twin's dependence. The classification was based on two questions: 'In your opinion are you dependent on your co-twin?' and 'In your opinion is your co-twin dependent on you?' (1) The Consonantly Dependent group included twins who considered themselves dependent and also perceived their co-twin as being dependent on them ($n = 41$ twin individuals, 10.3%). In the (2) Consonantly Independent group, one twin individual reported not being dependent and perceived the co-twin also as being non-dependent ($n = 346$ twin individuals, 86.5%). The (3) Dissonantly Dependent group consisted of twins who reported dependence for their own part, but viewed their co-twin as independent ($n = 4$ twin females, 1.0%). The fourth group, in which twin individuals had reported themselves independent but viewed their co-twin as dependent, was labeled (4) Dissonantly independent ($n = 9$ twin individuals, 2.3%).

Depressiveness scores were measured, as in a previous follow-up of the same twins in 1985 (a second follow-up study), by the Children's Depression Inventory (CDI) (Kovacs, 1980; Moilanen, 1987). Twenty-six of the 27 items were used, now modifying the questions to be suitable for this age; that is, replacing 'I never have fun at school' with '... during studies or work'. The item about suicidal tendencies had been excluded from the previous inquiries for ethical reasons and was excluded here as well. The items were scored from 0 to 2. In addition to total depressiveness, three subscores were formed based on a factor analysis performed on an epidemiological study in Finland (Moilanen, 1990). The factors were (1) low self-confidence (items: 'I hate myself', 'Nobody loves me', 'I look ugly', 'I am bad', 'I do everything wrong', 'I do very badly'), (2) anhedonia (items: 'Nothing is fun', 'Things bother me', 'I never have fun at my studies or at work'), and (3) sadness (items: 'I am sad all the time', 'I feel like crying', 'I feel lonely') (Ebeling et al.,

2003; Trias et al., 2006). The term depressiveness refers to depressive total score and does not constitute a clinical diagnosis of depression.

Items assessing somatic symptoms and nervous complaints were adapted, as previously in 1985, from previous Finnish studies on juvenile health habits (Rimpelä et al., 1983). Twins' self-reports of symptom frequency were classified into four categories, the frequencies of which were evaluated by assigning four ordered values to occurrences 'never or less than monthly', 'monthly', 'weekly', and 'daily'. Factor analysis had yielded two distinct factors (Moilanen, 1987): (1) nervous complaints (nervousness total) included nervousness, irritability, and loss of energy, and (2) somatic complaints (total score of somatic symptoms) included cephalalgia and abdominal pain (Moilanen, 1987; Porkka et al., 2004).

The mean values of the total depressiveness scores and subscores are presented. If the data were missing in one third or less of the sum-variable items (low self-confidence, anhedonia, sadness, nervous complaints and somatic complaints), the missing data were replaced by modes ($= 0$), otherwise the case was excluded from the analyses. In the statistical analyses, the Pearson Chi-Square test and Mann-Whitney U-test (two-tailed) were performed. As we mainly had both twins in each pair, the same-sex twins were not totally independent of each other. Therefore we also analyzed the data using weights in order to avoid replicates (Altman, 1991). In weighted Pearson Chi-Square test and weighted univariate analysis, the twins of SS pairs got a weight of 0.5 and the twins of OS pairs got a weight of 1. Although this method is conservative, the results were in accordance with the unweighted results, which are mainly reported in this paper. The analyses were performed using the SPSS (version 14.00) program. We wanted to test whether co-twin dependence was associated with psychiatric symptoms, and if twins from SS and OS pairs reported symptoms differently in connection with co-twin dependence.

Results

Table 1 shows the change in co-twin dependence at various ages in both genders as reported retrospectively in young adulthood. Co-twin dependence decreased with increasing age. In young adulthood females reported more co-twin dependence than males.

Distributions of co-twin dependence were evaluated in each zygosity group as well (Table 2). MZ twins reported most often co-twin dependence in both genders at all ages. In comparison between MZ and DZ twins in both genders, MZ males reported significantly more dependence before and at school age than DZ males while female MZ twins reported significantly more often co-twin dependence at all ages.

Distributions of dependence and pair-wise dependence in different twin types are presented in Table 3. MZ twins (21.7%) were three times more likely to report dependence than DZ twins ($< 7\%$). Regarding

Table 1
Distributions of Self-Reported Co-Twin Dependence in Each Gender Evaluated by Twins Themselves in Young Adulthood

Co-twin dependence	Males %	Females %	P
Before school age	67.9	75.0	NS
School age	54.4	60.3	NS
Young adulthood	7.3	15.2	.012 ^b
	(n = 195)	(n = 216)	

Note: Significances of differences between the genders have been calculated by chi-square test. Significances of differences showed an insignificant trend (.05 < p < .10)^b in weighted analysis.

pair-wise dependence, most twins could be classified as concordantly independent (84.4%). MZ twins were more likely to be from concordantly dependent twin pairs than DZ twins. With respect to the *individual twin's perception of the co-twin dependence* within the twin pair, most of the twins perceived their co-twin relationship as consonantly independent (88.4%). MZ twins were more likely to perceive their co-twin relationship as consonantly dependent (20.0%) than SSDZ twins (6.4%) or OSDZ twins (4.4%).

Depressive and psychosomatic symptoms in relation to co-twin dependence in young adulthood in each gender were evaluated. There were no significant differences found in depressive symptom reporting. However, dependent twins (Mean = 1.15, SD = .92, n = 46, males and females both) reported more somatic symptoms (total score) than the independent ones (M = 0.92, SD = 1.03, n = 352, p1 = .051 Mann-Whitney U-test, p2 ns weighted univariate analysis).

Depressive and psychosomatic symptoms in relation to co-twin dependence were evaluated separately in SS and OS twin pairs in each gender. In comparison between SS and OS twin pairs no significant differences were found among males. Dependent SS females reported less sadness (M = 0.13, SD = 0.34, n = 24) than dependent OS females (M = 0.88, SD = 1.13, n = 8, p1 = .019, p2 = .008). In comparison between the genders, dependent SS males reported less somatic symptoms (M = 0.64, SD = 0.67, n = 11) than dependent SS females (M = 1.29, SD = 0.91, n = 24, p = .041, p2 = .083).

The same evaluation was also performed in each zygosity group (Table 4), and again only few significant differences were found between dependent and

Table 2
Distributions of Self-Reported Co-Twin Dependence by Zygosity and Gender in Different Age Groups Reported by Twins Themselves in Young Adulthood

Co-twin dependence	MZM %	SSDZM %	OSDZM %	MZF %	SSDZF %	OSDZF%
Before school age	84.4	65.5	54.7	90.6	69.2	61.6
		P1 = .008 ^b	P2 = .013 ^b		P1 = .004 ^a	P2 = .010 ^b
School age	75.0	43.3	44.0	87.5	54.0	41.9
		P1 = .001 ^a	P2 = .006 ^b		P1 < .001 ^a	P2 < .001 ^a
Young adulthood	12.9	5.0	4.0	31.0	7.8	9.4
		P1 = .074	P2 = NS		P1 = .001 ^a	P2 = .005 ^a
	(n = 32)	(n = 60)	(n = 75)	(n = 32)	(n = 52)	(n = 86)

Note: P1 indicates significance of difference between MZ and DZ twins and P2 indicates significance of difference between all three zygosity groups in each gender (Chi-Square Test). Significances of differences remained significant ^a or showed an insignificant trend (.05 < p < .10) ^b in weighted analysis.

Table 3
Distributions Co-Twin Dependence in Individuals and Within Twin Pairs in Young Adulthood

Co-twin dependence	MZ% (n)	SSDZ% (n)	OSDZ% (n)	Total% (n)
Twin individuals (n = 331)				
Dependent	21.7 (13)	6.3 (7)	6.9 (11)	9.4 (31)
Independent	78.3 (47)	93.7 (104)	93.1 (149)	90.6 (300)
Pair-wise dependence (n = 141 pairs)				
Concordantly dependent	16.0 (4)	0.0	0.0	2.8 (4)
Concordantly independent	68.0 (17)	87.8 (43)	88.1 (59)	84.4 (119)
Discordantly dependent	16.0 (4)	12.2 (6)	11.9 (8)	12.8 (18)
Individual-based perception of pair-wise dependence (n = 328)				
Consonantly dependent	20.0 (12)	6.4 (7)	4.4 (7)	7.9 (26)
Consonantly independent	76.7 (46)	91.8 (101)	90.5 (143)	88.4 (290)
Dissonantly dependent	1.7 (1)	0.0	1.9 (3)	1.2 (4)
Dissonantly independent	1.7 (1)	1.8 (2)	3.2 (5)	2.4 (8)

Table 4

Depressive and Somatic/Psychosomatic Symptoms in Relation to Co-Twin Dependence in Young Adulthood

Depressive and somatic/psychosomatic symptoms	MZM Mean (SD)(n)	SSDZM Mean (SD)(n)	OSDZM Mean (SD)(n)	MZF Mean (SD)(n)	SSDZF Mean (SD)(n)	OSDZF Mean (SD)(n)
Depressiveness (total)						
Dependent	4.25 (3.40)(4)	2.00 (2.00)(3)	2.67 (1.53)(3)	3.56 (3.21)(9)	4.00 (4.08)(4)	7.43 (5.97)(7)
Independent	4.15 (3.67)(27)	3.65 (3.37)(57)	4.96 (4.61)(71)	5.10 (3.88)(20)	5.28 (4.11)(46)	4.69 (4.01)(77)
Low self-confidence						
Dependent	1.25 (0.50)(4) ^{1b}	0.67 (1.15)(3)	0.00 (0.00)(3)	0.22 (0.67)(9) ^{3b}	0.50 (1.00)(4)	1.00 (1.00)(7)
Independent	0.48 (0.85)(27)	0.61 (0.85)(56)	0.75 (1.28)(69)	0.75 (0.85)(20)	0.76 (0.82)(46)	0.79 (0.97)(76)
Anhedonia						
Dependent	0.75 (0.96)(4)	0.00 (0.00)(3) ^{2b}	0.67 (0.58)(3)	1.00 (1.07)(8)	1.00 (1.00)(3)	1.57 (1.27)(7)
Independent	1.12 (0.95)(26)	1.05 (1.03)(56)	1.24 (1.13)(68)	1.05 (0.78)(19)	1.04 (0.99)(46)	1.14 (1.20)(76)
Sadness						
Dependent	0.00 (0.00)(4)	0.00 (0.00)(3)	0.00 (0.00)(3)	0.11 (0.33)(9)	0.25 (0.50)(4)	0.88 (1.13)(8)
Independent	0.19 (0.49)(26)	0.08 (0.27)(52)	0.30 (0.53)(61)	0.50 (0.22)(20)	0.28 (0.54)(46)	0.25 (0.55)(75) ^{4a}
Nervousness (total)						
Dependent	2.50 (1.73)(4)	1.00 (1.73)(3)	2.00 (2.00)(3)	1.67 (1.22)(9)	2.00 (1.63)(4)	3.63 (2.77)(8)
Independent	2.30 (1.81)(27)	2.46 (1.86)(56)	2.87 (2.18)(69)	2.60 (1.90)(20)	3.02 (2.06)(45)	2.70 (1.85)(74)
Somatic symptom (total)						
Dependent	0.75 (0.96)(4)	0.67 (0.58)(3)	1.00 (1.00)(3)	1.22 (0.83)(9)	1.50 (1.29)(4)	1.50 (1.07)(8)
Independent	0.59 (0.59)(27)	0.44 (0.68)(57)	0.70 (0.93)(70)	1.50 (1.19)(20)	1.41 (1.17)(46)	1.23 (0.96)(74)

Note: Significances of difference between dependent and independent twins in symptom reporting were calculated by Mann-Whitney U Test. ¹ $p = .015$, ² $p = .062$, ³ $p = .054$, ⁴ $p = .042$. Significances of differences remained significant ^a or insignificant trend ($.05 < p < .10$) ^b in weighted univariate analysis.

independent twins. Dependent MZ males reported significantly lower self-confidence and females who were dependent on their twin brother (OS females) reported significantly more sadness than the independent ones.

Pair-wise dependence, based on self-reports of both twins of the pair, was also evaluated in relation to depressive and psychosomatic symptoms, but no significant differences were found.

However, when the individual-based perception to pair-wise dependence (reflecting twin's subjective experience of dependence within the pair) was evaluated in relation to symptom reporting, dissonantly

dependent twins showed most total depressiveness and sadness while consonantly dependent twins reported least sadness (Table 5).

Discussion

This sample of twins permitted their follow-up from pregnancy to young adulthood, to analyze changes in the inter-twin relationships with regard to co-twin dependence at different ages and developmental stages. The present article is based on an analysis of the questionnaires administered when the twins were 22–30 years old.

Table 5

Depressive and Somatic/Psychosomatic Symptoms in Relation to Individual-Based Perception of Pair-Wise Dependence Evaluated by Twins in Young Adulthood

Depressive and somatic/psychosomatic symptoms	Consonantly dependent Mean (SD)	Consonantly independent Mean (SD)	Dissonantly dependent Mean (SD)	Dissonantly independent Mean (SD)	Total Mean (SD)
Depressiveness (total)	3.95 (2.95)	4.55 (4.01) <> ⁴	8.00 (8.76)	5.11 (3.72)	4.54 (3.97)
Low self-confidence	0.63 (0.99) <> ¹	0.69 (0.99)	1.25 (1.26)	0.67 (0.71)	0.69 (0.98)
Anhedonia	0.82 (0.85) <> ²	1.10 (1.06)	1.50 (1.91)	1.22 (1.30)	1.07 (1.06)
Sadness	0.15 (0.42) <***> ³	0.20 (0.51) <***> ⁵	1.25 (1.50) <*> ⁶	0.33 (0.50)	0.21 (0.52)
Nervousness (total)	2.32 (1.90)	2.62 (1.93)	3.75 (3.20)	3.44 (3.44)	2.61 (1.94)
Somatic symptoms (total)	1.07 (0.91)	0.92 (1.03)	1.75 (0.96)	0.78 (0.83)	0.94 (1.02)
	(n = 41)	(n = 340)	(n = 4)	(n = 9)	(n = 398)

Note: No significant differences were found in Kruskal Wallis Test.

Bonferroni significance levels * $p < .05$, ** $p < .01$ and *** $p < .001$. <> indicates the significance between the two groups beside each other. <>> indicates the significance between the two groups apart from each other.

Significances of differences in weighted univariate analysis: ¹ $p = .058$, ² $p = .058$, ³ $p = .014$, ⁴ $p = .017$, ⁵ $p < .001$, ⁶ $p = .040$.

Co-twin dependence decreased with increasing age in both genders (Table 1). This phenomenon can be understood by the developmental tasks twins undergo, namely the process of separation and individuation from each other. Thus, our results suggest that the relationship between co-twins changes and assumes different forms over time and with increasing age. Dependence in the twin relationship is likely to level off, and twins become more and more independent in their actions and behaviors. While school-aged twins are often emotionally close and are likely to spend time together, it is during this period that parents start to encourage separation (Koch, 1966). In adolescence twins often 'revolt' against twinship (Ainslie, 1985). They are less likely to want to dress alike, they often intentionally select different activities and are less likely to report sharing friends (Ainslie, 1985). Young adulthood is an age when individuals increasingly assume responsibility for their own lives. Additionally, it is no longer possible to rely on the help of the co-twin, as young adults usually separate and live apart.

In our study MZ twins, especially MZ females, reported most often to be dependent on their co-twin (Table 4). In earlier studies MZ twins have also reported that they are closer to or more dependent on one another than DZ twins in school age, adolescence as well as in adulthood (Koch, 1966; Neyer, 2002; Penninkilampi-Kerola et al., 2005; Tambs et al., 1985). The intensity with which twins appear to be drawn to each other and therefore to identify with each other seems to be affected by the degree to which they resemble each other. It is much easier also for the parents and other persons around to relate to twins as individuals when distinct differences exist, especially if they are of opposite gender, compared to those who are very much alike (Leonard, 1961). Co-twin dependence has also been associated with gender, as females are more likely to report being co-twin dependent than males in all zygosity groups (Penninkilampi-Kerola et al., 2005; Sanathara et al., 2003).

In contrast to previous studies (Bornstein, 1992; Sanathara et al., 2003), our findings did not show significant differences in depressive symptom reporting between dependent and independent male and female twins. Dependent twins, however, reported more somatic symptoms than independent ones. This could indicate the difficulty of these dependent twins in experiencing and expressing negative feelings verbally, which are then expressed by somatic symptoms.

In further analysis in different twin pairs, there was no significant relation found between co-twin dependence and symptom reporting in SS female or in OS male twins. It could be that being dependent on a female twin partner might protect from depressiveness. This situation concerning co-twin dependence appeared to be different from the situation of co-twin submissiveness to a twin sister, which was previously found to be stressful (Ebeling et al., 2003). Dependence on a twin partner thus may indicate a

feeling of being well cared for by the twin sister (Bryan, 1992).

Contrarily to the situation with a twin sister, it seemed more difficult to be dependent on one's twin brother, as dependent MZ males reported significantly lower self-confidence, and females who were dependent on their twin brother (OS females) reported significantly more sadness than independent ones. Again, the situation seems to differ from that of co-twin submissiveness as it was previously found that it is easier especially for females to be submissive to a male twin partner (Ebeling et al., 2003). Thus, our results support the findings of previous studies suggesting that twinship constitutes a different growing environment for MZ, SSDZ and OSDZ twins (Allen & Pollin, 1976; Ebeling et al., 2003; Pulkkinen et al., 2003).

In comparing between the genders in different twin pairs, the differences in symptom reporting were smallest among OS twin pairs. A similar phenomenon was also found in a previous follow-up of this same twin sample, when the twins were 12–20 years of age (Porkka et al., 2004). Possibly OS twins influence each other, thus decreasing the above mentioned gender differences. Growing up in an SS twin pair seems to enhance the development of personality features typical of the gender, as the differences between genders were most distinct in these pairs.

Dependence-independence imbalance within twin pair was associated with elevated levels of symptom reporting, especially in twins who perceived themselves as dependent and the co-twin as independent. These dissonantly dependent twins showed the most depressive symptoms while consonantly dependent twins reported the least symptoms. This agrees with findings by Penninkilampi-Kerola (2006), who found dissonantly dependent twins to have significantly higher rates of depressiveness than consonantly independent twins. Thus, our results may suggest that twins' 'subjective' experience of the balance or imbalance in the co-twin relationship is more important for the mental wellbeing than 'actual' balance/imbalance of the relationship when the information is provided by the two twin individuals of a twin pair (pair-wise dependence). However, depressive symptoms might as well influence the twins' subjective experience of the balance or imbalance in the co-twin relationship. In other words, it might be that depressive twins to a higher degree tend to report themselves as dependent and their co-twin as independent, than non-depressive twins. The small number of these dissonantly dependent twins in our sample may warrant some caution in generalisation of these results.

One may speculate that the quality of emotional dependence plays a more essential role in a twins' wellbeing than the simple distinction of whether a twin is dependent or not (Bornstein, 1992). Even though the majority of theoreticians and researchers have focused primarily on the negative consequences of dependent personality traits (Kendler et al., 1998; Sanathara et al.,

2003), dependence is also associated with positive traits, such as the ability to infer accurately the attitudes and beliefs of others — that is, interpersonal sensitivity (Bornstein, 1992). Furthermore, behavior that looks like dependence may be an expression of attachment to the co-twin, which is activated in a constructive manner when there is a need for proximity and support; for example, in moments of distress and anxiety. Thus, we believe, in accordance to Bornstein (1992), that the behavior of the dependent person can only be completely understood with reference to the context in which it is exhibited.

One limitation of the study was the small number of dependent twins, especially when evaluated in different twin pairs and zygosity groups, warranting some caution in generalizing our findings. Another limitation was that the quality or severity of co-twin dependence was not evaluated. As the analyses rely on self-reported data of co-twin dependence and symptom reporting, they must be interpreted as twins' subjective experience.

We conclude that there was no relation found between co-twin dependence and depressive symptom reporting in male and female twins. In further analysis it seemed that being dependent on one's female twin partner was experienced more positively than being dependent on a twin brother.

In line with earlier studies (Bruch, 1969; Ebeling et al., 2003; Penninkilampi-Kerola, 2006), our results also indicate that it is important to take the individual as well as dyadic nature of the twin relationship into consideration when studying its implications on twins' mental wellbeing. In our study, subjective experience about co-twin dependence appeared to be important for the twin's mental wellbeing, as dependence–independence imbalance within twin pair was associated with elevated levels of symptom reporting, especially in twins who perceived themselves as dependent and the co-twin as independent. However, we see a correlation between dependence–independence imbalance and a higher degree of depressive symptoms reported, but we do not see the direction of the causality, which might be the opposite; it may be that depressive twins to a higher degree tend to report themselves as dependent and their co-twin as independent, than non-depressive twins.

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